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JOURNAL
OF
THE PROCEEDINGS
OF
THE LINNEAN SOCIETY.

ZOOLOGY.

VOL. III.

LONDON:
LONGMAN, BROWN, GREEN, LONGMANS & ROBERTS,
AND
WILLIAMS AND NORRIS.
1859.

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PROCEEDINGS
OF THE
LINNEAN SOCIETY OF LONDON.

November 5th, 1857.

Thomas Bell, Esq., President, in the Chair.

The Secretary announced that during the recess an additional pair of Cabinets for the Society's Collection of Fruits and Seeds had been presented by Thomas Corbyn Janson, Esq., F.L.S.; and the special thanks of the Society were directed to be presented to Mr. Janson for this useful and acceptable present.

Dr. Berthold Seemann, F.L.S., read a detailed report of his visit to Montreal, as the representative of the Linnean Society at the Meeting of the American Association for the Advancement of Science in that city, of which the following is an abstract:—

Availing himself of the free passage placed at the disposal of the Linnean Society by the liberality of the British and North American Royal Mail Steam Packet Company, Dr. Seemann embarked at Liverpool on the 25th of July, on board the 'Persia,' and arrived at New York on the 5th of August. Thence he continued his journey by railway, *via* Albany and Burlington, to Montreal, which he reached a few days previous to the commencement of the meeting, and was most hospitably received, and treated with much consideration by the Local Committee, including Sir William Logan, F.R.S. (the Chairman), the Lord Bishop of Montreal, Professor Dawson, and other distinguished men. On the 11th, Dr. Seemann was introduced by Lieut.-Colonel Munro,

F.L.S., at his *conversazione*, to Professor Caswell, of New Providence, the Acting President, and to Professor Lovering, of Cambridge, Massachusetts, the Secretary of the Meeting; and on the following day presented to them the official letter of the President of the Linnean Society, of which he was the bearer. Both gentlemen expressed themselves highly gratified with the attention shown by the Linnean Society in sending a delegate to the meeting, and showed him marked attention during its continuance. He was also introduced in his official capacity to Sir W. Eyre, K.C.B., Acting Governor-General of Canada, who complimented the Linnean Society on the encouragement given by it to the first meeting of the American Association held on British ground. The meetings were held in the New Court House at Montreal, commencing on the 12th of August and lasting for a week. Professor Caswell opened the session with a powerful speech, in the course of which he announced the presence of delegates from the Geological and Linnean Societies of London, and introduced Professor Ramsay and Dr. Seemann to the meeting. In his reply, Dr. Seemann took occasion to express the high esteem and respect of the Linnean Society for the American Association, and the deep interest with which the Society regarded its labours, and to offer in the name and on the behalf of the Linnean Society the most sincere wishes for the unabated continuance of that success which had hitherto attended it. The number of members attending the meeting amounted to upwards of five hundred, the greater part of whom had come from the United States, although Canada and the other British provinces of North America were, in proportion to their extent and population, equally well represented. It was generally considered to be one of the most successful meetings that had been held in any part of the American continent. Geologists were in great force; Physicists and Ethnologists were also numerous; but there was a comparatively small attendance of Botanists and Zoologists. Dr. Seemann attended daily, and at one of the meetings read a Paper "On the so-called Parthenogenesis in Animals and Plants," in which he presented a summary of the present state of that interesting question. Two other Fellows of the Linnean Society were also present at the meeting, viz. the Rev. William Hincks, Professor of Natural History in the University of Toronto, and Lieut.-Colonel Munro, in command of the 39th Regiment, stationed at Montreal, both of whom showed Dr. Seemann great attention. Of our Foreign Members, there were present, Professor Dana, of

New Haven (elected President of the Natural History Section), and Dr. Torrey of New York. Of the scientific bodies of Europe which had been invited to send delegates to this meeting, the Geological and Linnean Societies of London were the only ones that responded to the call, and their representatives were also the only Members who had come from Europe for the occasion. The cordial reception which they met with, and the universal desire expressed by the Americans for a more frequent intercourse with their European brethren in science, took, on the occasion of the last General Meeting, a substantive form in the following Resolution, moved by Professor Bache of Washington, and carried by unanimous consent:—"That the American Association recognizes with peculiar satisfaction the presence of eminent scientific men from the Old World who have honoured this meeting with their attendance, and it hopes that now, since the ice has been broken, these meetings of fraternity among men of science from different continents will be more frequent." On the 20th of August, after the termination of the meeting, Dr. Seemann left Montreal for the Falls of Niagara, the managers of the railroads and steam-boats on the route kindly placing a free pass at his disposal. Thence he proceeded, by way of Buffalo and Indianapolis, to St. Louis, Missouri, where the Academy of Natural Sciences elected him a Corresponding Member. On the 1st of September he quitted St. Louis for New York to pay a visit to Dr. Torrey, and from thence proceeded to Boston, where he was kindly received by Professor Asa Gray. On the 9th he went on board the steamer 'America,' and after touching at Halifax, reached Liverpool on the 22nd of the same month, after an absence from England of fifty-nine days.

The thanks of the Society were voted to Dr. Seemann for the readiness with which he had undertaken, and the ability with which he had executed his mission.

Read, first, a "Note on the Occurrence of *Phyllosoma commune* on the coast of Cornwall;" by Jonathan Couch, Esq., F.L.S. (See "Zoological Proceedings," vol. ii. p. 146.)

Read, secondly, the commencement of a Memoir "On the Agamic Reproduction of Aphides;" by T. H. Huxley, Esq., F.R.S. Communicated by Professor Busk, Zool. Sec. L.S. (See "Transactions," vol. xxii. p. 191.)

November 19th, 1857.

Thomas Bell, Esq., President, in the Chair.

Charles Knight, Esq.; George G. Macpherson, Esq.; and Wilfred Dakin Speer, Esq., were elected Fellows.

Read the following letter from Lady Smith, the widow of the Founder of the Society :—

“ Lowestoft, 12th November, 1857.

“ GENTLEMEN,—I hope you will do me the honour to accept the accompanying nineteen volumes, comprising the whole of Sir J. E. Smith's scientific correspondence from the time of his becoming possessed of the Collections of Linnæus till his death in 1828. There are some among your number who, I believe, will peruse these letters with a pleasure nearly equal to that I have enjoyed in arranging them for the present object. They bear ample testimony to the correctness of an observation Sir James made long ago—‘That the pursuit of Natural History is an unerring clue to an intercourse with the best minds.’ A spirit of affection and respect flows through the whole correspondence, so that those who may take no interest in the pursuits that occasioned this intercourse, will nevertheless be attracted by the warmth of friendship, the confidence and personal attachment and esteem that pervade the whole.

“ I have two conditions to propose concerning these volumes. The first is, that they shall not be taken from the Society's rooms for perusal.

“ The second, that if in the course of events the Society of which you are members should cease to exist, or merge into any other Society, I wish these volumes to escape being dispersed, and desire they may be placed in the British Museum with the library of Sir Joseph Banks, and there preserved.

“ Trusting that such a disposition of them may long be averted by your continuance as a Society, in which I feel the deepest interest, I remain, Gentlemen, with great respect,

“ Your faithful Servant,

(Signed)

“ PLEASANCE SMITH.”

“ *To the President and Fellows of the Linnean Society.*”

On the motion of Dr. Boott, seconded by C. Cardale Babington,

Esq., it was resolved that the cordial and affectionate thanks of the Society be given to Lady Smith for her invaluable present.

Read, first, a "Notice of Four Varieties of British Plants;" by John Hogg, Esq., M.A., F.R.S., F.L.S. (See "Botanical Proceedings," vol. ii. p. 133.)

Read, secondly, a "Notice of a Monstrosity of *Scabiosa succisa*, L., and of some other Vegetable Monstrosities;" by Professor Bentley, F.L.S.

Read, thirdly, a "Note on a diseased bunch of Grapes;" by M. T. Masters, Esq. Communicated by the Secretary.

Read, fourthly, "A short Exposition of the Structure of the Ovule and Seed-coats of *Magnolia*;" by Asa Gray, M.D., F.M.L.S. (See "Botanical Proceedings," vol. ii. p. 106.)

Read, fifthly, "Notes of a Botanical Ramble in the North of Spain;" by Joseph Woods, Esq., F.L.S. (See "Botanical Proceedings," vol. ii. p. 111.)

December 3rd, 1857.

Thomas Bell, Esq., President, in the Chair.

Thomas Allis, Esq., and Henry Letheby, Esq., M.B., were elected Fellows.

Professor Owen, F.R.S., F.L.S., exhibited specimens of the pods of *Gleditsia triacanthos*, L., which had ripened fully and abundantly in his garden in Richmond Park, during the present year.

Read, first, "Observations on *Entozoa*, with descriptions of several new species;" by Thomas S. Cobbold, Esq., M.D., F.L.S. (See "Transactions," vol. xxii. p. 155.)

Read, secondly, a Paper "On the genus of *Annelida*, named 'Palolo' by the Samodas;" by J. D. M'Donald, Esq. Communicated by George Busk, Esq., F.R.S., Zool. Sec. L.S. (See "Transactions," vol. xxii. p. .)

December 17th, 1857.

Thomas Bell, Esq., President, in the Chair.

Edward William Cooke, Esq., A.R.A., and Francis Day, Esq., were elected Fellows.

Read, first, a Memoir "On the Zoology of New Guinea;" by Philip Lutley Sclater, Esq., M.A., F.L.S. (See "Zoological Proceedings," vol. ii. p. 149.)

Read, secondly, a "Botanical Report on the North-Australian Expedition, under the command of A. C. Gregory, Esq.;" by Dr. Ferdinand Müller, Botanist to the Expedition. Communicated by the Colonial Office. (See "Botanical Proceedings," vol. ii. p. 137.)

Read, thirdly, "Notes on Dr. Asa Gray's Observations on the Ovules and Seed-coats of *Magnolia*;" by John Miers, Esq., F.R.S., F.L.S.

January 21st, 1858.

Thomas Bell, Esq., President, in the Chair.

Walter Lowry Buller, Esq.; William Charles Hood, Esq., M.D.; William Lauder Lindsay, Esq., M.D.; John Lubbock, Esq.; Buxton Shillitoe, Esq.; and Francis Cornelius Webb, Esq., M.D., were elected Fellows.

Among the presents were specimens of the fruits of *Physianthus albens* and *Stephanotis floribunda*, ripened in Cornwall, the former in the open air and the latter in a greenhouse, presented by Mrs. Fox, of Grove Hill, near Falmouth; of the fruit of *Kalreuteria paniculata*, ripened (for the first time) during the past autumn, in Chelsea Garden, presented by Thomas Moore, Esq., F.L.S.; and a specimen of the fruit of *Ailantus glandulosa*, ripened, last autumn, at Stoke Newington, near London, presented by Richard Kippist, Esq., Librarian L.S.

Read, first, an Extract of a Letter from Dr. Baikie to Sir John

Richardson, M.D., C.B., F.R.S. and F.L.S., dated 29th October, 1857, at Rabba on the Quorra, giving some account of the proceedings of the Expedition under his charge up to that date. (See "Zoological Proceedings," vol. iii. p. 76.)

Read, secondly, a Note "On the importance of a Microscopic Study of the Integuments in Crustacea;" by T. Spence Bate, Esq., F.L.S. (See "Zoological Proceedings," vol. iii. p. 1.)

Read, thirdly, the conclusion of Professor Huxley's Memoir "On the Agamic Reproduction of *Aphides*;" commenced at the meeting of November 5th, 1857.

February 4th, 1858.

Francis Boott, Esq., M.D., Vice-President, in the Chair.

Peter Squire, Esq., was elected a Fellow.

Read, first, a Memoir "On the Shell-bearing Molluscos Animals with reference to Structure and Form;" by Robert Garner, Esq., F.L.S.

Read, secondly, an Extract of a Letter addressed to Professor Bentley, F.L.S., by Mr. Barter, the Naturalist accompanying the Expedition up the Quorra, dated Rabba, September 29th, 1857.

Read, thirdly, a Paper "On the Question whether Linnæus, in a spirit of ill-will, altered the spelling of the name of the genus *Buffonia*?" by Mons. A. L. A. Fée, Professor of Botany of the Faculty of Medicine at Strasburg. Communicated by Thomas Moore, Esq., F.L.S. (See "Botanical Proceedings," vol. ii. p. 188.)

Read, lastly, a "Note on M. Fée's communication;" by John Joseph Bennett, Esq., F.R.S., Sec. L.S. (See "Botanical Proceedings," vol. ii. p. 188.)

February 18th, 1858.

William Baird, Esq., Member of Council, in the Chair.

Alexander Fry, Esq., was elected a Fellow.

Read, first, a Memoir "On the Muscles of the Larvæ of several species of *Tipulidæ*;" by John Lubbock, Esq., F.L.S. (See "Transactions," vol. xxii. p. 173.)

Read, secondly, a "Note on the genus *Hemigymnia*, Griffith;" by Thomas Thomson, Esq., M.D., F.R.S., F.L.S. (See "Botanical Proceedings," vol. ii. p. 126.)

Read, thirdly, a Paper "On the probable Metamorphoses of *Pedicularia* and other genera of *Gasteropoda*;" by J. D. M'Donald, Esq., R.N. Communicated by George Busk, Esq., F.R.S., Zool. Sec. L.S. (See "Transactions," vol. xxii. p. .)

Read, fourthly, a "Monograph of the *Eucalypti* of Tropical Australia;" by Ferdinand Müller, Ph.D. Communicated by Dr. Hooker, V.P.R.S., F.L.S. (See "Botanical Proceedings," vol. iii. p. 81.)

Read, fifthly, a Paper "On the Anatomy of *Eurybia Gaudichaudi*, as bearing on the position of the *Pteropoda*;" by J. D. M'Donald, Esq., R.N. Communicated by the Zoological Secretary. (See "Transactions," vol. xxii. p. .)

March 4th, 1858.

J. D. Hooker, Esq., Member of Council, in the Chair.

Mr. Allan Black was elected an Associate.

Mr. Ward, F.R.S., presented specimens of White or Fat Turf from the Island of Valentia in the west of Ireland; and a letter was read addressed to Mr. Ward by Dr. Lecky, giving some account of the substance.

Read, first, a Note "On *Pseudocentrum*, a new genus of *Orchideæ* from Peru;" by Professor Lindley, F.R.S., F.L.S. (See "Botanical Proceedings," vol. iii. p. 63.)

Read, secondly, a second part of Professor Lindley's "Contributions to the Orchidology of India." (See "Botanical Proceedings," vol. iii. p. 1.)

Read, thirdly, a Memoir "On the Tribe *Legnotideæ*;" by George Bentham, Esq., F.L.S. (See "Botanical Proceedings," vol. iii. p. 65.)

Read, fourthly, a "Synopsis of the Fructification of the compound *Sphæriæ* of the Hookerian Herbarium;" by Frederick Currey, Esq., F.L.S. (See "Transactions," vol. xxii. p. .)

March 18th, 1858.

Thomas Bell, Esq., President, in the Chair.

John Cockle, Esq., M.D., and William Hitchman, Esq., M.D., were elected Fellows.

Among the presents was a cast of a Bust of the late Dr. Pereira, F.R.S., F.L.S., presented by Mrs. Pereira, to whom the cordial thanks of the Society were voted for her very acceptable present.

Read, first, "Contributions to the Anatomy and Natural History of the *Cetacea*;" by Robert Knox, M.D., F.R.S.E. Communicated by the Secretary. (See "Zoological Proceedings," vol. iii. p. 63.)

Read, secondly, "A Note on the genus *Abuta*;" by N. Grisebach, Professor of Botany in the University of Göttingen. Communicated by Dr. Hooker, F.L.S. (See "Botanical Proceedings," vol. iii. p. 108.)

April 1st, 1858.

Thomas Bell, Esq., President, in the Chair.

Robert W. Hall, Esq., was elected a Fellow.

Mr. Bentham, F.L.S., exhibited specimens of *Asteranthos*, Desf., collected by Mr. Spruce on the Rio Negro in Northern Brazil, and read some observations on its history and affinities. (See "Botanical Proceedings," vol. iii. p. 80.)

Read, "Contributions to Organographic Botany;" by Christopher Dresser, Esq. Communicated by the Secretary.

April 15th, 1858.

Thomas Bell, Esq., President, in the Chair.

William Frederick Saunders, Esq., was elected a Fellow.

Read, first, a "Catalogue of Hymenopterous Insects, collected at Celebes by Mr. A. R. Wallace;" by Frederick Smith, Esq. Communicated by W. W. Saunders, Esq., V.P.L.S. (See "Zoological Proceedings," vol. iii. p. 4.)

Read, secondly, a Paper "On some tuberiform Vegetable Productions from China;" by the Rev. M. J. Berkeley, M.A., F.L.S. (See "Botanical Proceedings," vol. iii. p. 102.)

Read, thirdly, "Notes on Arctic Plants;" by George Dickie, M.D., A.L.S., Prof. Nat. Hist. Queen's Coll. Belfast. (See "Botanical Proceedings," vol. iii. p. 109.)

May 6th, 1858.

Thomas Bell, Esq., President, in the Chair.

Eardley G. Culling Eardley, Esq., was elected a Fellow; and Professor Albert K  lliker, and Professor Karl Theodor Ernest von Siebold, were elected Foreign Members.

S. James A. Salter, Esq., F.L.S., exhibited a living specimen of a species of Rat, frequently observed of late on board of vessels in British ports, and made some observations on the characters by which it is distinguished from the original British Rat (*Mus Rattus*, L.).

Read, first, "Contributiones ad Acaciarum Australi   cognitionem;" by Dr. Ferdinand M  ller. Communicated by George Bentham, Esq., F.L.S. (See "Botanical Proceedings," vol. iii. p. .)

Read, secondly, a Note "On a new species of *Bellevalia* from Mount Ida;" by Maxwell T. Masters, Esq. Communicated by the Secretary. (See "Botanical Proceedings," vol. iii. p. 113.)

Read, thirdly, an "Enumeration of the Mosses of India;" by William Mitten, A.L.S. (See "Botanical Proceedings," Supplement for 1858.)

May 24th, 1858.

Anniversary Meeting.

Thomas Bell, Esq., President, in the Chair.

This day, the Anniversary of the birth of Linnæus, and the day appointed by the Charter for the Election of Council and Officers, the President opened the business of the Meeting with the following Address:—

GENTLEMEN,

WHEN I first ventured to break through the previous custom of the Society, by offering an address to the Fellows at the Anniversary, I felt that I must not depend upon always finding, in the annual retrospect of our own doings, sufficient subject for the occupation and amusement of the time allotted to that object.

On one or two former occasions I had indeed many circumstances of interest to communicate to you, relative to our removal to the place of what I trust may prove our permanent abode, and I last year took the advantage which that event offered me, of adverting to the foundation, development and results of our Society. As long as our circumstances were changing and our final destiny was in abeyance or suspense, there were subjects constantly presenting themselves sufficiently interesting to occupy a due portion of the time which intervenes between the initiatory routine of the day's business, and the final ceremony of the opening of the ballot glasses. But the very settlement of our difficulties, and the solution of our doubts, whilst filling us with the happy sense of the fruition of our hopes and wishes, deprive me of such themes for my address, and throw me again upon the consideration of some of those means of increasing the prosperity and thus extending the usefulness of our Society, which are indicated by daily experience, and the ever-changing and progressing march of natural knowledge.

When I last addressed you on a similar occasion to the present, we had just entered upon the occupation of our new abode. We could not then consider ourselves settled, scarcely even secure; but a twelvemonth's occupancy has now removed all doubt of the absolute enjoyment of the advantages which we then only believed in, and might almost tempt us to yield to a feeling of quiet and satisfied security, and to adopt the sentiment of the Poet,

"Invenimus portum; spes et fortuna, valet!"

But if any such feeling of finality in our labours could ever enter the mind or pervade the feelings of the Society, surely nothing could be more entirely misplaced, nothing more calculated to interfere with the fulfilment of our great mission, and to paralyse those efforts without which we must fail in carrying out the objects of our corporate existence. It is, indeed, in our present improved condition, with an increased income, enlarged communication with the scientific world, and a closer association with other scientific bodies, employed like ourselves zealously and constantly in the advancement of knowledge,—with responsibilities increased in proportion to our means and the requirements of scientific progress,—that we ought to recognize an irresistible claim upon our energies, and fresh inducements to enter, with all our powers, and with all the zeal which so noble an object demands, upon the fulfilment of the duties which are imposed upon us, and which we have solemnly accepted as our own.

That it is unnecessary, however, to employ any argument to remind the Society of those duties, or to stimulate it to their fulfilment, is proved by the state of activity and vigour by which it is at present characterized. The number and importance of the communications which have occupied our ordinary meetings, where we have no longer the necessity of listening to, or (*proh pudor!*) of nodding over the fortunately interminable commentary on the *Hortus Malabaricus*, which served for so many years as a *pièce de résistance*, not to say a stop-gap, to prevent the formal *exposé* of our occasional literary bankruptcy,—these circumstances, with the usually satisfactory attendance at our meetings, show a degree of active vitality which is at once a cause of thankful satisfaction and of hopeful anticipation.

With reference to the latter portion of our functions, there is, however, one point which calls for observation, and has been a source of great regret. I alluded to it at the last Anniversary, and made some observations upon the subject, to which I am sorry to have again to recur. I mean the comparative paucity of zoological communications when contrasted with the number and extent of those devoted to the sister science.

The high character of many of those zoological papers which we have received, does not render it less a matter for serious consideration, whether some plan might not be adopted to effect an improvement in so important an element of our functions. That the principal cause of the deficiency is to be sought in the same direction as that to which I pointed on the former occasion, can-

not be doubted. I mean the existence and working of minor societies; one pursuing a single isolated branch of zoology; another adopting an exclusive means of investigation, and thereby contracting its sphere of information on any particular branch; and a third taking up the whole extent of the Animal Kingdom, and thus antagonizing directly and throughout its entire scope, that important portion of our own field of action; for there is scarcely a meeting of any one of these departmental Societies, as I may term them, at which there are not communications read, which would deserve a place in our own Transactions or Journal.

This subject has long engaged my most anxious attention, and I cannot but hope that some plan might be wrought out, which would enable this Society to afford the great advantage of its acknowledged prestige, and the extensive circulation of its publications, to many of the more important of the communications to which I refer. I do not profess satisfactorily to have matured any such plan; but I have thought much on the subject, and have conferred with those whom I thought likely to afford me available counsel; and I will now take the liberty of laying before you some thoughts respecting it, which, though crude, may induce those whom I address to give it their consideration, and thus probably lead to some practicable and available expedient.

At the same time it must be acknowledged that there are great difficulties in the way of such an adjustment. The whole subject of the relation between minor or branch societies and the parent or central one, and the question of the utility to Science of such dismemberment are involved in it. This is a matter to be approached with diffident and cautious, but I trust not without hopeful consideration.

On the motives which usually lead to the establishment of such societies it is not necessary to dwell at any length, and in some instances I fear that any such investigation would appear an invidious one. It is more important to endeavour to discover the means by which such diversion of the stream of knowledge into smaller collateral channels, shall be rendered innocuous or useful, and temptation to further subdivision diminished.

It is an argument commonly urged by the advocates of such dissociation as we are now considering, that it comes within the same category as the great general question of the advantages resulting from the subdivision of labour; but it appears to me that the analogy is altogether unreal, or at most very partial in

its application. Were a Society, engaged in the promotion of any great department of science, made to consist of various sections, to each of which should appertain the cultivation of one individual branch, and each contributing its gains to the general treasury of the whole body, the analogy would be true and comprehensible. But far different from this is the case before us.

In the present instance the contributions of the different sections are wholly diverse in their direction and aim; and the individual bodies, so far from deriving strength and efficiency from their separate action, are weakened like the segregated sticks of the bundle in the fable, by the absence of mutual support and cooperation.

That a sincere anxiety and singleness of endeavour for the acquisition and spread of scientific knowledge is the worthy motive which induces many a zealous naturalist to join in and promote the subdivision in question, cannot for a moment be doubted. The overwhelming mass of daily additions to our knowledge of mere isolated facts, the constant influx of newly discovered species, having no obvious bearing on any question of moment, the geographical distribution of individual forms, the periodicity of the various phases of animal functions and habits, and a thousand other circumstances which, although unimportant in their individual and unassociated entities, are yet worth preserving *as* truths, or *as* having some future possible bearing upon more important generalization, appear to require some means by which their record may be established and their publicity secured; and this necessity has doubtless its bearing upon the utility of associations having for their object the fixing and utilizing of such otherwise evanescent units of knowledge. But it becomes again a question whether their preservation might not be equally provided for, without the expense both of time and money which is contingent upon the working of so many distinct bodies.

This observation leads me to consider for a moment another, and I have reason to believe a very general reason for the exclusive association of good and zealous men with some of the minor societies. I mean the small comparative expense to which they are subjected. This certainly appears, on the face of it, a very plausible reason for abstaining from a union with the larger and more expensive institutions. The difference between three guineas and one guinea annually is so considerable, that I doubt not there are many sincere and devoted naturalists to whom it would just present the alternative between the propriety and prudence

of expending the one or the other in the enjoyment of their favourite pursuit.

For myself, I have always been the advocate for reducing the annual subscription in Scientific Societies to the lowest sum consistent with the efficient carrying out of their objects; and I have not only entertained myself, but proposed for the consideration of my colleagues, the question whether some reduction might not be adopted in our own annual contribution or entrance fee. My full conviction, however, is that under existing circumstances such reduction is utterly impracticable; but how far this desirable end would be furthered by the members of the minor societies joining us, and thus at once increasing our income and strengthening our efficiency, is, I submit, worthy their consideration. Besides this, if we even adhere to the argument of the *quid pro quo*, it must be recollected that the Transactions and other publications of those Societies are not presented to the members without payment, whereas ours, often of considerable pecuniary as well as intrinsic value, are given to every contributing Member without additional expense. Surely these advantages, which appeal to the mere financial motive, in addition to the free use of all the noble libraries now collected within these walls, are more than an equivalent for the additional annual expense. You will at once perceive that these remarks are only partially applicable. There are some Institutions with pursuits collateral with our own, which have not even the pecuniary plea for separation.

I am too well aware, however, of the importance of the contributions to Natural Science emanating from the various societies to which I have referred, to look with indifference or lack of respect upon their labours. I know full well that many of the most important works of the first naturalists of our age and country have come before the public under the auspices of these associations; that the Transactions of the Zoological Society are half-filled with the contributions of the most eminent naturalists of this country; that those of the Microscopical and Entomological Societies contain papers of great value on recondite physiological subjects, or learned generalizations on some of the most interesting branches of Natural History. But it must be remembered that the separate working of each of these bodies is attended with great expense, independent of that which is required by the mere publication of each individual paper in connexion with others, and that this expense would be greatly lessened in each case,

were the power by which the separate bodies are moved, concentrated into one great machine.

In Botanical Science this distribution of the means of recording discovery has not been thought necessary; and it would certainly appear somewhat strange if we were to hear of the formation of a Ranunculaceous Society, as distinguished from a Liliaceous, or even a Cryptogamic as independent of, and antagonistic to, a Phanerogamic Society. Yet, viewed with relation to the true principles of classification, there appears to be no more incongruity in these absurd examples, than in the separation of the Entomologists from other cultivators of Natural History, and still more, the subdivision of the former into Coleopterists and Lepidopterists, and the latter into as many branchlets as there are groups in the great order of scaled-winged insects.

In the vegetable kingdom, the Linnean Society is the main recipient of contributions to that important branch of natural science in this country; and I rejoice as heartily as the most exclusive votary at the shrine of Flora, at the vigorous strides which that charming science is making, and at the high character of the papers in that department of Natural History which appear in our own publications. I feel it to be matter of honest congratulation, that the Society has been so long, and still continues to be, the medium of thus contributing to the diffusion of botanical knowledge throughout the world. It is not because I have been led more particularly into the study of animal existences, that I can have any wish to see Zoology occupy an undue or predominant situation in our proceedings here. It would ill become me, in the position in which you have done me the honour to place me, to exhibit or to feel any partiality for either. Not Dido herself could have uttered with more sincerity than I do, "*Tros Tyriusve mihi nullo discrimine agetur.*" It has, I hope, been the guiding principle of my conduct, certainly of my intentions, since I have occupied this chair; but I cannot but consider it most desirable and important that a Society like ours, professedly devoted equally to the two branches, and with all the machinery necessary for the equal promotion of both, should not have its means curtailed, and its usefulness impaired in relation either to one or the other. The relative number of contributions to our Society during the past year in the two departments, exclusive of statements of isolated facts, or passing and ephemeral subjects, gives force to my present appeal, and shows the reality of my complaint.

In the remarks which I have considered it my duty to make

upon this difficult and somewhat distasteful subject, I hope it is unnecessary for me to declare that I have not been actuated by any feeling inconsistent with a full appreciation of, and sincere respect for, those scientific bodies on whose relation to ourselves I have animadverted, and of admiration of the results of their labours. Still less is it possible that I could entertain any feeling of personal or corporate rivalry. Many of the most distinguished members of those very Institutions are our fellow-members here, our personal friends and joint labourers in the same field. Nay, many are at this moment within the hearing of the unpalatable truths which I have felt called upon to utter. But I have considered it right to speak plainly my thoughts upon a matter which has long caused me great anxiety, and to which, perhaps from long pondering upon it, I may have been led to attribute what others may deem a more than deserved importance.

And now it may be reasonably demanded, after all that has been said on the disadvantages of such divisions as I have been deprecating, supposing all that has been asked to be granted, what means are proposed to meet the difficulty and to obviate the asserted evil? This is, indeed, a much more perplexing and complicated question; and I am free to confess that I, for one, am not prepared with any immediate practicable remedy. There are, however, some suggestions which have occurred to my mind in reflecting upon the subject, which, with great diffidence and a deep sense of all the vagueness and obscurity that hangs about them, I will venture to offer.

In the first place, even acknowledging on the one hand all the evils of the system which I have assumed, these Societies do exist, and have existed long enough to be firmly established. They are working and working with good effect. There are honest, truthful, talented, enlightened men engaged in that working. They constitute a great and important fact;—and must be dealt with, if at all, as associate and fellow Institutions with our own. What I am anxious to see is, not their present antagonism, but their union with us, as far as practicable, in such a relation as shall be mutually advantageous. Not as at present, the child taking food from the parent's mouth,—not the sucker depriving the tree from which it springs of its nourishment and growth and strength.

One of the most obvious means suggesting itself for carrying out this object, is that the Societies in question should, in such manner as they may see best, communicate to the Linnean Society such papers as appear particularly calculated for publication

in our Transactions or Proceedings. There are three Societies especially, from which papers might, on this plan, be communicated,—the Zoological, the Entomological and the Microscopical. With regard to the first of these, it would be impossible for us, without considerable pecuniary assistance, to publish the luxuriously beautiful illustrations which, from the pencil of the first animal draughtsman of this or perhaps any former period, have, for some years, rendered the octavo publication of that Society the most beautiful and elegant periodical work on the Natural History of Animals that has ever appeared. Nor does it seem necessary or desirable, even were it possible, that the description and figuring of every new species should devolve upon the Linnean Society. There are many very valuable papers requiring few and inexpensive or perhaps not any illustrations, which, from their more abstract scientific character, would form suitable and important matter for our publications; and these may either be read at the meetings of both the Societies, or sent directly to us from the Publication Committee of the other Society; or it may be so far understood that papers of this description are not considered as their legitimate object, as that authors would send their papers immediately to us.

The proposal of this change in the publishing province of that important Institution, cannot be considered as in any degree disrespectful to its scientific members. It is in fact perfectly consistent with a step in the same direction which the authorities of the Society have themselves adopted. By the recent discontinuance of the quarto Transactions, they have virtually implied the future refusal of such papers as require quarto illustrations; and the change which I have now suggested is only another step in advance of their own progress. They have repudiated a certain class of papers upon no principle whatever having relation to either the matter or design or character of such papers; but only with reference to the size of the plates required for their illustration; and there can be no sacrifice of principle involved in the further change suggested, but only an extension *upon* principle of a course already arbitrarily commenced. And it must not be forgotten that the whole scientific element of that great Society (the abolition of which element, be it remembered, is not within the terms of my proposition) is but an adjunct to its original constitution and aim, organized too by an almost suicidal act of the Zoological body of this Society, who converted a very promising auxiliary of their own raising into a powerful and successful

rival. But I will not trouble you by a recapitulation of the observations which I made on this fact last year; I recur to it principally to show that the two characters in which the Zoological Society appeals to the public are essentially different, and that there is no more congruity in such an association, than there would be if the Horticultural Society were now to attempt to combine with that useful practical character which has rendered it so deservedly popular, a more purely scientific element, and, usurping the functions of our own botanical department, receive and publish such papers as now find their place in our own Transactions.

With respect to other Societies having the same relation to ours as regards their objects, a similar course, *mutatis mutandis*, might be adopted; but it is unnecessary that I should further take up your time by suggesting details, the discussion of which, whatever might be the result of the consideration of the general principle, would at present be wholly premature.

The great importance of the object of these observations prevents me from wholly passing over two other ideas which have occurred to my mind, and, in various modifications, to the minds of others, but which at present appear so impracticable, and to require for their fulfilment so large a change in the present working of the Society, that I cannot for a moment entertain them as worthy of serious discussion. In the first place, it has been questioned whether the desirable result of bringing those congenial Societies, which are now separated from us, within our own sphere, might not be obtained by offering to those of their existing members who have been such for a given number of years, the remission or reduction of the entrance fee, supposing that, on being proposed and balloted for, they should be elected as Fellows of this Society. The other proposal has been, to form a new body of Associates, for the admission of such persons as, cultivating any branch of Natural History, are willing to join our Society, paying a smaller annual contribution, and having limited advantages. I do not enter into any detailed plan as connected with either of these proposals, because I do not believe that it would be possible or desirable to carry them out; but I thought it my duty to lay before you whatever had occurred to myself or others, as a means for obviating the difficulty in which the present state of things has placed us.

I must repeat, that I consider the serious imperative mission of this Society, as the centre of Natural History Science in this country, to consist in taking every available means, honestly and

earnestly and with a high and unselfish aim, to further the advance of those branches of science to which it is devoted. If circumstances are found to exist which interfere with the fulfilment of this object, it becomes our duty to endeavour by all the fair and honourable means in our power to obviate them. I have approached the subject on which I have so long detained you with great diffidence and reluctance. I am well aware that I may have laid myself open to misapprehension, but I felt it imperative upon me, placed where I am by your confidence and good opinion, to give you unreservedly my feelings and thoughts upon a matter in which I believe the welfare of the Society, and consequently the progress of Natural History, are in a greater or less degree involved; and I have only now to say, "*liberavi animam meam*," and to leave the subject in your hands. And now, Gentlemen, I apply myself with great pleasure to matters of a more agreeable character.

It is with great satisfaction that I call your attention to what I have always considered a very important and useful portion of our Museum department, and one peculiarly appropriate to the original object of this Society as distinctly expressed in our charter, which defines that object to be "the cultivation of the Science of Natural History in all its branches, and *more especially* of the Natural History of Great Britain and Ireland." I allude to the British Herbarium. The existence of several typical and well-known collections of our native plants which have at various times come into our possession, appeared, now that we have ample room for their arrangement and use, to afford a most desirable opportunity of forming as complete an assemblage as possible of our national Flora, of which those collections should form the nucleus. Your Council have therefore named a Committee, consisting of three of the most competent British botanists in the Society, for the accomplishment of this object; and I am sure you will agree with me, when I mention the names of Dr. Alexander, Mr. Charles Cardale Babington, and Mr. Bentham, that a better selection could not have been made. These gentlemen have conferred a great benefit on the Society by kindly accepting the task, and they have now entered upon their labours. The basis of the proposed herbarium is being selected from the collections of Mr. Winch and of Dr. Withering, and the deficiencies will be filled up by contributions offered by various Fellows of the Society. The Committee have the advantage of the assistance of Mr. Daniel Oliver, one of our Fellows, who has under-

taken the task of selecting, laying out and arranging the specimens, and Mr. Babington that of checking the names attached to them. The Committee report their full confidence that, by this means, a very complete British Herbarium will be formed, in which all marked varieties will be included; and there can be no doubt that it will be found a most useful standard collection for reference. I cannot but believe that this new feature in our arrangements will be viewed with the greatest satisfaction by the numerous cultivators of British Botany, who will thus have, at length, a complete and well-arranged herbarium of our native plants constantly accessible for consultation and comparison.

It is not my intention to occupy your time by entering upon any analysis of the papers, many of them of great interest, which have occupied the Society at its meetings during the past year. A glance at our two publications will sufficiently attest the zeal and talent which have characterized them, and I believe I may without hesitation assert that they have not been surpassed by those of any former year. That the forthcoming part of the Transactions will consequently maintain the character, both at home and abroad, which has for so long a period attached to that our principal publication, I cannot doubt. The Journal of Proceedings also continues to give the greatest satisfaction in every quarter from whence I have had an opportunity of obtaining an opinion, and its efficiency and importance are now fully established. It has enabled us to publish very many papers of high interest, which but for such a vehicle could scarcely have been published at all, or at least only after a long interval. I may here aptly quote the words of one of our most distinguished Fellows, who thus expressed himself in a letter which I not long since received from him:—

“The number of excellent papers,” he says, “which we have had this session, constitute quite an epoch in the history of Natural Science. I know of no Society at home or abroad that can boast of such an array of valuable papers as we can already show for this one half-session.”

The general satisfaction of the Fellows of the Society with its present condition and with the manner in which its affairs are conducted, is evinced by the cheering and I believe unprecedented fact, that the whole past year has not witnessed a single instance of withdrawal from its ranks. I cannot but attribute this circumstance in great measure to the manner in which their interest is kept alive by the appearance at intervals of our Journal of Pro-

ceedings, especially as regards our country Fellows, whose connexion with the Society is mainly kept up by this means.

The present state of our Finances, with so considerable a balance in our hands, for which I refer you with great pleasure to the Auditors' Report, will I trust enable your Council to turn their attention to the gradual increase of the Library, which is very deficient in some departments of Natural History literature. The proximity and common use of the Library of the Royal Society, which contains a considerable number of the more expensive works on local Natural History, such as several of the beautifully illustrated French Voyages and others, will assist in enabling us to direct our means towards the acquisition of less expensive but equally useful works, and to the completion of some important serial publications. At the same time it must be remembered that this can only be done at present to a very limited extent, as the illustrations of some of the most valuable of the papers which have been lately read will necessarily be very expensive.

Amongst those who have been recently removed from us by death, is our old and respected friend Richard Horsman Solly, who for more than thirty years was one of the most constant attendants at our meetings, and a liberal contributor to any pecuniary exigency whenever an appeal was made to him; and he has shown a lasting interest in the welfare of the Society to which he was so long and so warmly attached, by a legacy of £100.

I cannot conclude this brief allusion to the most prominent circumstances or events of the past year, without calling particular attention to the accession to our library of the whole of the scientific correspondence of our founder, presented to us, since the last anniversary, by his honoured widow. This important gift is not more acceptable on account of its intrinsic value, great as that is, than as a graceful evidence of attachment and respect from one, who, during the life of her revered husband, was ever associated with him in the deep interest he took in Natural Science and in the welfare of our Society in particular; and who now, at a very advanced age, and as full of energy as of years, has shown, by this munificent act, that she still recurs with fond recollection to the favourite object of her husband's scientific life, and retains, even now, a vivid interest in our pursuits, and a warm and earnest wish for our prosperity.

There are some other additions to our rooms by gift which I cannot pass over without remark. The widow of one of our highly valued members, the late Dr. Pereira, has kindly presented

us with a faithful bust of her excellent husband. A portrait of our esteemed friend and Fellow, Mr. Ward, painted by Mr. Knight the Royal Academician, and acknowledged to be an admirable likeness as well as an interesting and beautiful picture, has been presented by a number of gentlemen, not confined to Fellows of this Society, by whose subscription, this pleasing testimony to Mr. Ward's scientific and social claims to our esteem and gratitude has been produced. And lastly, we have received within the last few days an interesting bust of the great LINNÆUS, a copy of the original in the Hall of the Academy of Sciences of Stockholm; this valuable addition to our memorials of the distinguished men who have been more or less closely associated with the objects of the Society, was presented to us by Professor Anderson.

We have now had twelve months' experience of our close local association with the Royal Society, and have been able to test the result of our meeting on the same evening with them. With regard to the first, I think I may safely say that our proximity has been the source of great advantage to us, and I am sure that it has tended to the increase of kindly feeling and good fellowship between the two bodies. On more than one occasion this has been evident, when a union of action was necessary to carry out some important object; and it is my pleasant duty to say that nothing can exceed the kind consideration and ready cooperation which have characterized the conduct of the authorities of that respected body. Our evening association with them after the business of the two Societies has been concluded, has also had the effect of bringing us into close and friendly relation, and has never materially interfered with our scientific arrangements.

I have now, I believe, Gentlemen, glanced at the principal circumstances which demand allusion from me. Upon the whole, our retrospect affords us ground for great thankfulness and congratulation. Our position is in almost every respect greatly improved. Our finances are not only now in a prosperous state, but our means will be still further increased, by the cessation of rent for the house in Soho Square at the approaching autumnal quarter. Our numbers are gradually being augmented by the addition of active and zealous and intelligent naturalists. Our publications are increasing in importance, and are everywhere more and more appreciated and valued.

That this state of progress may continue, nothing now is needful but a perseverance in the same course of energy and vigour, combined with good feeling and kindly brotherhood, which, I thank God, has long been characteristic of our Society.

OBITUARY NOTICES.

The Secretary then read the following notices of deceased *Fellows* and *Foreign Members* :—

For the brief notice which I am about to offer to the Society, of *Henry James Brooke, Esq.*, I am chiefly indebted to an article in the last Anniversary 'Proceedings' of the Royal Society, of which what follows is little more than an abstract. He was born on the 25th of May, 1771, in the city of Exeter, where his relatives were engaged in the manufacture of broadcloth, but was himself destined for the bar, for which profession he had nearly completed his studies when an advantageous opening led him to engage in the Spanish wool-trade. He spent nearly two years in Spain, and subsequently formed an establishment in London, where he took up his abode in 1802, devoting his leisure to the study of mineralogy, geology, and botany, but especially of the two former sciences, to which he became devotedly attached. He became a Fellow of the Geological Society in 1815, of the Linnean in 1818, and of the Royal in 1819. When the trade in Spanish wool was in a great measure superseded by that with Germany, Mr. Brooke turned his attention to other objects of commercial pursuit more congenial to his tastes, and entered warmly into the formation of companies for working the mines of South America; but these speculations having for the most part failed, he became secretary to the London Life Assurance Association, of which he had been one of the founders. In 1828 he maintained the principles on which the business of that association was carried on, in "Observations on a pamphlet by Mr. Morgan, entitled a View of the Rise and Progress of the Equitable Society." A slight concussion of the brain, the result of being thrown down by collision with a horse, and followed by symptoms of undue cerebral excitement, compelled him for some years to limit his customary mental efforts; and during this period he occupied himself in the collection of shells and of engravings. Of the former he made a large collection, which he afterwards presented to the University of Cambridge. While engaged in its formation, he published, in the fifth volume of the 'Zoological Journal,' a paper on "Conchology, regarded as a distinct branch of Science," in which he maintains that "the proper study of shells may not inaptly be considered as analogous to that of the skeletons of the higher classes of animals, and may be regarded as the comparative anatomy of the molluscous

inhabitants; and if it were so pursued, those who study shells alone might, without the fear of being regarded as triflers, confess themselves to be conchologists, and might thus assert their title to a place in the ranks of science." Mr. Brooke's reputation as a man of science was, however, chiefly derived from the eminence which he attained as a mineralogist, and especially as a crystallographer, in which department he stood almost unrivalled in this country. His "Familiar Introduction to Crystallography, including Explanations of the Principle and Use of the Goniometer," was published in 1823, and was followed, at a considerable interval, by a treatise on the same subject in the 'Encyclopædia Metropolitana.' In the latter of these works he greatly simplified the system which he had proposed in the former, and reduced the number of primary crystalline forms to six. With much labour and perseverance, he applied the reflective goniometer to the crystals of artificial salts, and published, in the 'Annals of Philosophy' for 1823, the determination of the forms of no fewer than fifty-five different laboratory crystals. He published also numerous mineralogical notices, including the description of thirteen new mineral species, in the pages of the 'Philosophical Magazine' and 'Annals,' and in the 'Edinburgh Philosophical Journal,' and was the author of the treatise on mineralogy in the 'Encyclopædia Metropolitana.' His latest labours were directed to the general relations and geometrical similarity of all crystals belonging to the same system, a paper on which subject, read before the Royal Society, was in the press at the time of his decease, and affords a striking proof how little his advanced age had diminished the strength and energy of his reasoning powers. He died, at his residence at Clapham, on the 26th of June, 1857, soon after completing the 86th year of his age, from natural decay, accelerated by the depression of his system produced by a severe cold; and his splendid collection of minerals has since been presented to the University of Cambridge, as the best means of rendering it subservient to the advancement of mineralogical science.

William Maddocks Bush, Esq., M.D., died at Weston-super-Mare on the 17th of December, 1857, aged 44 years. Dr. Bush completed an excellent general education at Eton in 1830, when he commenced his course of medical studies at St. George's Hospital, and subsequently prosecuted them at the London University. Having become a Member of the Royal College of Surgeons of England, and a Licentiate of the Society of Apothecaries, he was appointed one of the House Surgeons of the Marylebone Infirmary,

where he acquired extensive medical knowledge and experience. After this he visited the Medical Schools of Paris and Germany, in one of the universities of which latter he graduated as an M.D. During all these professional labours his mind was not inattentive to other kinds of knowledge. He was an ardent lover of nature under all her forms; but perhaps his greatest leaning to either branch of Natural History was to Botany, of which he had acquired considerable knowledge. He was elected a Fellow of the Linnean Society in 1843, and about the same time the Royal College of Physicians in London admitted him a Licentiate, *ex urbe*, of their body. The time having now arrived for selecting a department of his profession in which to bring his acquirements to a practical use, he selected that of Psychology, with the treatment of the insane mind. In this, both in the Metropolis and in the provinces, he was eminently successful, and was much consulted by his professional brethren. In connexion with this subject he was the author of an excellent pamphlet on "The General Paralysis of the Insane," a subject at that time but little attended to; and more lately he wrote a valuable monograph on "Moral Delinquency in Children," or an exposition of the early tendency to insanity in childhood, partly the result of hereditary predisposition, and partly the consequence of imperfect and misdirected education. When the photographic art became more generally known, Dr. Bush very early observed how advantageously a good manipulator might apply the processes to record objects in Natural History. He became an ardent practitioner of the art, and had gained great efficiency in it, producing beautiful specimens from various natural sources, especially from the vegetable kingdom; but, unfortunately, in his manipulations his skin absorbed some of the poisonous matters used in the preparation of his paper, and this becoming diffused through his body led to inflammation of the veins in his extremities; from thence the inflammation spread gradually to the great blood-vessels of the trunk, and led to his premature decease. His rectitude of heart and life, his amiable and conciliatory manners, and his devoted love of nature endeared him to a numerous circle of friends; while this Society has to record the loss of a member who promised greatly to advance the objects of the Society itself, and who happily blended the characters of the gentleman and the man of science.

Lieut. James Holman, R.N., F.R.S., universally known as "the blind traveller," was born at Exeter, in the county of Devon, October 15th, 1786. Although not distinguished as a naturalist,

the career of this gentleman offers so remarkable an instance of energy and perseverance in carrying out what appears to have been an irresistible impulse for visiting foreign and distant lands under circumstances which might be supposed to present almost insuperable obstacles, that I need scarcely apologize for dwelling upon it at some length. He was first sent to a day school in Theatre Lane, Exeter, kept by an old woman, at which he remained until he was between eight and nine years of age, when he was transferred to a private school near Alphington Cross, kept by the well-known Dr. Halloran; and afterwards to another school, where, as he says, he was crammed with geography, astronomy, algebra, geometry, navigation, &c., in order to fit him for the position of first-class volunteer obtained for him by Lord Bridport through the kindness of General Simco. He accordingly joined, in December 1798, being then twelve years old, the Royal George, 100, Captain C. M. Pole, bearing Lord Bridport's flag, in the English Channel; was present at the attempt at Basque Roads, and, after two unsuccessful applications to Lord Bridport to be allowed to join cruising frigates, was placed on board the *Cambrian*, 40, Captain Legge, in which he served from 1799 to 1805 on the Home and North American stations. He then joined in succession the *Leander* and *Cleopatra*, of which latter frigate he was appointed lieutenant, April 27, 1807. He was next employed in the *Guerrière* frigate, on the North American station, from October 1808 to November 1810, when, in consequence of severe rheumatism brought on by the hard service on that station, he invalided, and was placed on half-pay, returning to England in January 1811, in H.M. Brig *Fantôme*. In July of that year he was visiting his friends at and near Bath, when he was attacked with severe ophthalmia, which in a short time entirely deprived him of sight. In 1812, having become permanently blind, he was made a Naval Knight of Windsor. During the next seven years he devoted his time so much to the study of literature (entering at the University of Edinburgh, where he obtained a diploma), that his health suffered severely, and he was compelled to seek restoration in the air of his native county. Not finding the benefit he expected, this, together with the permission which he had obtained to absent himself from Windsor, induced him, in the year 1819, to visit the South of France alone, and without any knowledge of the continental languages. He then made the grand tour, passing through the south of France into Italy, traversing the greater part of both the southern and northern states of that peninsula, cross-

ing into Savoy by Mount Cenis, proceeding thence by Chambery to Geneva, and through Switzerland to Basle, descending the Rhine to the sea, and from Amsterdam passing by the Hague, Rotterdam, and Antwerp to Brussels, returning to England, by Ostend, in September 1821. An account of these travels was published by him in 1822, under the title of "A Narrative of a Journey undertaken in the years 1819, 1820, and 1821, through France, Italy, Savoy," &c. &c. In July 1822, he embarked alone from the London Docks for St. Petersburg, and had proceeded through Russia into Siberia, traversing it as far as Irkoutsk (2000 miles beyond Tobolsk), intending to embark at Kamtschatka for Sitka on the north-west coast of America, and thence to proceed to the Sandwich Islands, &c., when his progress was checked by a mandate from the Emperor of Russia, under which he was conveyed as a state prisoner to the confines of Cracow, and there dismissed. The motive for this proceeding was said to be a belief that he was an English spy and that his blindness was only feigned. He then proceeded through Austria, Bohemia, Saxony, Prussia, and Hanover to Hamburg, and arrived at Hull in June 1824. Of these travels also a narrative was published in 1825. In July 1827 he proceeded with Captain Owen of H.M.S. *Eden* to South Africa, visiting by the way Madeira, Teneriffe, St. Jago, Sierra Leone, Cape Coast, Accra, Fernando Po, Bonny, Calabar, &c., Prince's Island and Ascension; after leaving which island, falling in with a Dutch galliot on its way to Rio de Janeiro, he transferred himself and baggage to that vessel. From Rio he visited the gold mines, and after journeying through the Brazils, quitted S. America for the Cape of Good Hope in H.M. Brig *Falcon*, Captain Pole, and after traversing the Cape Colony and part of Caffreland, left Simon's Bay for Mauritius, Madagascar, the Comoro Islands, Zanzibar, and the Seychelles, returning thence to the Mauritius. He then proceeded to Colombo, and having travelled through Kandy and made the ascent of Adam's Peak, embarked at Trincomalee for Pondicherry and Madras, and thence for Bangalore, returning by Chittoor and Arcot to Madras, from which he sailed for Masulipatam and Calcutta. In August 1830, he left that city for China, visiting Penang, Malacca, Singapore, and Canton, whence he sailed for Hobart Town. He next traversed Van Diemen's Land, proceeded to Sydney, and after travelling in the interior of Australia, left for England, visiting on his way home New Zealand, Bahia and Flores, and arriving in August 1832. The narrative of these travels was published in four volumes in 1834 and 1835, under the

title of "A Voyage round the World." In August 1836, he proceeded to the north of Ireland, where he remained during the next three months. He paid a short visit to the Channel Islands, St. Malo, and Dinant in the summer of 1839. In the latter part of 1840 he embarked at Blackwall for Falmouth and Oporto, landed there, and visited the following places in succession, viz. the Alto-Douro, Lanego, Oporto, Lisbon (visiting St. Ubes, the salt-pans of Rio Lado, Cintra, Colares, and the English lines), Cadiz, Seville, Port St. Mary, and Xeres, Gibraltar, Ceuta, Malaga, Granada, Almeria, Carthagena, Alicante, Valencia, Barcelona, and Tarragona. From Barcelona he proceeded to Majorca, Minorca, Algiers, Bona, Tunis, and Carthage; thence to Malta, the Ionian Islands, Patras, Athens, the island of Syra, Smyrna, Rhodes, Beyrout, and Alexandria; from thence to Cairo, Suez, Moses' Wells, &c. Then from Cairo he crossed the Desert, to Jerusalem by way of El Arish, then to the Jordan, Dead Sea, and Bethlehem; then from Jerusalem to Nazareth, the Sea of Galilee, Mount Carmel, Acre, Tyre, Sidon, and Beyrout. From Beyrout he went to Tripoli, the island of Rhodes, Latakia, Sudea (on the Orontes); thence to Antioch, Aleppo, and Hamman, by the Desert, to Damascus, and across the Lebanon and Anti-Lebanon back to Beyrout. This he left for Alexandria, Malta, and Naples, from the latter place making his way through Apulia, Calabria and Sicily to Reggio, and thence back to Naples. He then proceeded through the Abruzzi to Pescara on the Adriatic, Loretto, Rimini, Ravenna, Ferrara, Padua, Venice, Udine, Goritz, and Trieste; thence to Fiume, Zara, Libenico, Nur, Seigu, Spalatio, by sea to Ragusa and Boca di Cataro, making a tour in Montenegro, and returning to Boca di Cataro and Ragusa, then voyaging to Stagno, crossing the Isthmus, thence through the Gulf of Narenta, up the little Narenta river, returning to Fort Opus and Metcavitch, and descending the main stream of the Narenta to the sea, along the coast to Spalatio, from thence going to Seigu, and entering Bosnia by Billibuch, passing to Zavena, Travnich, Kisalovoda and Sana, to the frontiers of Servia, thence to Belgrade, down the Danube to Giurgevo, Bucharest, and Ibrail, across the Sereth to Galatz, thence to Jassy and through the Bukovina, Transylvania, and Hungary to Vienna. Then through Austria, Bavaria, and the Tyrol to Italy, visiting Verona, Lodi, Milan, Pavia, Genoa, and Nice; thence to Toulon, Marseilles, Avignon, Nismes, Montpellier, Cette, Perpignan, St. Louis, and the Pyrenees, Arriège, Bagnères de Bigorre, Cauterets, Pau, and Bayonne. Thence into Spain by Vittoria to Valladolid, visiting from thence

Leon, thence to Madrid, Talavera, Badajoz, and into Portugal, visiting Elvas, Lisbon, Bucellas, Figuera, Cintra, Oporto, and Vigo, returning to Oporto by sea, thence by Corunna, Bilboa, and San Sebastian to Bayonne. Leaving Bayonne for Bordeaux, Saintes, Cognac, Charente, Rochfort, Rochelle, Bourbon-Vendée, Nantes, L'Orient, Brest, Morlaix, Dinant, Avranches, Granville, Cherbourg, Caen, Havre, Rouen, Chateauroux, Limoges, Agen, Auch, Pau, Cauterets, Bagnères de Bigorre, Toulouse, Lyons, Vichy, Moulins, Macon, and Chalons-sur-Saone to Dijon, Chalons-sur-Maine, Rheims, St. Quentin, Valenciennes, Lille, and Dunkirk to Calais and Boulogne, returning to England in October 1846. In the spring of 1852 he again embarked from Hull for Norway and Sweden; after travelling through which countries for a few months, he returned to England. This was the last journey he made, otherwise than by paying occasional visits to Boulogne and Bath. During the last few years most of his time was spent between Windsor and London, while at the former place secluding himself completely from all society, occupying himself wholly in writing the account of his later travels and an autobiography, and thereby so materially injuring his health that after a short illness of four or five days he died, July 28th, 1857, in the 71st year of his age. He became a Fellow of the Linnean Society in 1826, and of the Royal Society in the following year. As many among us can bear testimony, he was a most cheerful and agreeable companion, full of information and anecdote on a great variety of subjects; and these qualities are so conspicuously displayed in the published Narratives of his Travels, that it is earnestly to be hoped that those of later date may also ere long be given to the world.

John Macmillan, Esq., M.D., entered the Royal Navy and became full Surgeon in 1807. He was for some time on the South Sea station, and after his return to England became, in 1820, a Fellow of the Linnean Society. He subsequently retired to Culross in the county of Perth, where he died on the 1st of the present month, after a long illness, at the age of 81.

Sir George Magrath, M.D., C.B., K.H., &c., entered the Navy at an early age as an Assistant Surgeon, and was present in that capacity on board the *Theseus* at the evacuation of Fort Matilda, Guadaloupe, in the year 1794. As Surgeon of the *Russell* he took part in the action off Camperdown in 1797, and was appointed Superintendent of the Hospital for Dutch prisoners subsequently established at Yarmouth. In 1801 he was again surgeon of the

Russell at the attack on Copenhagen, and was afterwards Flag Medical Officer to Lord Nelson in the Mediterranean, and had charge of the hospital at Gibraltar during the fever which raged in 1804 and 1805. He was elected Fellow of the Colleges of Physicians of London and Edinburgh, and became Physician Extraordinary to the Duke of Clarence when appointed Lord High Admiral. In 1841 he was promoted to the rank of Inspector of Hospitals, and continued during the remainder of his life to reside at Plymouth, where he died on the 12th of last June, at the age of 82. His remains were interred in the burying-ground of St. Andrew's church, and were attended to the grave by a large concourse of people, including many of the neighbouring gentry. He became a Fellow of the Linnean Society in 1816, of the Royal Society in 1819, and was likewise a Member of the Royal Irish Academy, and a Fellow of the Geological Society. Besides the distinctions already mentioned, he had a medal with two clasps for Camperdown and Copenhagen, and was a Knight Commander of the Portuguese Order of the Cross of Christ.

John Forbes Royle, Esq., M.D., F.R.S., F.G.S., Officer of the Legion of Honour, was the only son of Capt. William Henry Royle, an officer in the service of the Hon. East India Company, and was born at Cawnpore. Having lost his father while yet a child, he received his early education, first under the care of Dr. Sangster, and afterwards at the High School of Edinburgh. He was originally destined for the profession of arms; but while waiting for an appointment at Addiscombe, he became a pupil of Dr. Anthony Todd Thomson, under whose able tuition he acquired so strong a taste for Natural History, and especially for Botany and its useful applications, that he was induced to decline the military appointment, and to accept in its place, as soon as he had obtained his diploma, an Assistant-Surgeoncy in the Company's service. In 1819 he proceeded to Calcutta on the medical staff of the Bengal army. He was first posted to the artillery at Dumdum, and for two or three years afterwards he was moved from station to station in Bengal or the North-western provinces, discharging subordinate medical duties, as the ordinary routine and exigencies of the service demanded. While thus employed, he availed himself of every opportunity that change of locality afforded to acquire a knowledge of the natural productions of the country. Among these, the study of Indian plants occupied the first place, and drew him into correspondence with Dr. Wallich, at that time Superintendent of the Hon. Company's Botanical Garden at Cal-

cutta. A vacancy having occurred in the charge of the Botanical Garden at Saharunpore, Dr. Royle was, fortunately for science, selected as the best-qualified candidate, and appointed Superintendent in 1823. No station in India is more happily situated for the cultivation of the natural sciences. Eastward of Delhi, elevated 1000 feet above the level of the sea, near the extreme northern limit of that part of the great plain of India which is included in the valley of the Ganges, within a few miles of the Sewalik Hills, and within easy range of the great chain of the Himalayah, the position commands alike the tropical flora and fauna of the plains of India, the temperate of the snowy range, and every transitional stage between the two. Dr. Royle possessed the acquirements, through education and self-culture, the energy of character, and the ardent love of science, to avail himself to the full measure of these advantages. The public garden, supported by a native endowment, and laid out after the simple native geometrical plan, with abundance of fruit-trees and common flowering plants, was entirely remodelled by the new superintendent, after the most approved style of English landscape gardening. A large addition was made to the number of species grown, indigenous and exotic; a scientific arrangement was introduced; a conservatory sprung up; an ample stream of running water was introduced, which fell into an artificial lake; in short, every refined alteration was adopted by which a tame oriental garden could be converted into a beautifully-planned and useful scientific institution. The whole was the creation of Dr. Royle. His other duties, including the medical charge of the station of Saharunpoor, with two hospitals, deprived him of the opportunities of travelling, necessary for the thorough investigation of the natural history of so rich a field; but, to compensate as much as possible for this drawback, he deputed parties of plant-collectors in successive years to the various mountain provinces in the neighbourhood, across the snowy range into the Thibetan boundary of Kunawur; and as far westward as the valley of Cashmeer. By these means he soon amassed a rich and valuable herbarium. But his natural bent was most strongly exhibited in the investigation of the properties of plants, and their application to the wants of man. For a considerable time he supplied the hospitals of Bengal with indigenous drugs, as substitutes for the expensive articles imported from Europe. He devoted himself with great success to the identification of the articles now occurring in the bazaars of the East with the medicines familiar to the

Greeks, as described by Dioscorides and Theophrastus. He investigated the agricultural resources of the plains of India, with a view to the improved culture and introduction of various grains, and of plants yielding fibres and other useful products; and he endeavoured to direct attention to the capabilities of the valleys and slopes of the Himalaya for the growth of tea, which has been so successfully carried out by his successors. Dr. Royle's principal work, "*The Illustrations of the Botany, &c. of the Himalaya Mountains*," is a storehouse of valuable facts and information, bearing on all these and other allied subjects, and has been largely drawn from by every writer of authority who has since devoted his labours to the properties and uses of plants. The favourable situation of Saharunpoor provided other tempting fields of natural investigation, which his ardent zeal would not permit him to neglect. Single-handed he undertook the severe task (for a tropical climate) of horary observations of the thermometer dry- and wet-bulb, and of the barometer, on a single day in each month throughout the year, besides the regular ordinary observations twice a day, and by these means attained excellent data for determining the meteorological conditions of the climate, and fixing one of the standard stations by which the range of mean temperature over the continent of India has been ascertained. He made collections of the mammalia, birds, reptiles, and insects of the northern plains and mountains of India, in themselves so valuable and extensive that they furnished materials for two important and distinct memoirs, by eminent British naturalists, upon the fauna of India, contained in his great work before referred to. During his various journeys through the Himalayan mountains, he carefully collected specimens of all the rocks he met with, marked the direction and measured the inclination of the strata, ascertained the elevations of the successive ridges, and the depressions of the intervening valleys, by barometrical measurement, and recorded the whole of the observations with such care, that, gleaned materials from other sources, and aided by Sir Henry De la Beche, he was enabled to produce a very creditable approximative geological section across the chain of the Himalayas, from the plains of Hindostan on to the snowy range, which was also brought out in his '*Illustrations*.' All these varied and extensive researches were condensed within the comparatively short period of eight years. Patient of labour, and self-exacting to the full measure of his physical powers, he never remitted his exertions, nor yielded to the enervating effects of a tropical climate. Gifted by nature

with a strong frame and a constitution that never failed him, and which sickness never touched, he toiled on, from first to last, the earnest and ardent investigator of every natural object that came within his reach. One incident, connected with Dr. Royle's service in India, redounds so highly to his scientific credit that it appears deserving of an honoured record. The first Burmese and other wars had brought the finances of India to an unusually disastrous state; and the home authorities devolved upon the Governor-General, Lord William Bentinck, the ungrateful task of retrieving the untoward position by unpopular measures. Retrenchment the most ruthless was applied to every department of the public service that would admit of the process. The medical branch suffered most, and was struck down at one blow from affluent ease to comparative indigence. Dr. Royle, in his medical relations, suffered equally with the rest of his brethren; but the Botanical Garden at Saharunpore was for the time spared, as an outlying exception. At last the Governor-General visited the station with the announced intention of abolishing the Botanical Garden. It was remote and unfrequented, and therefore doomed. Dr. Royle, dissatisfied with the turn which the service had taken, was on the eve of vacating his appointment, on promotion to a higher grade, and returning to Europe to resign the service. Yet so good a show did he make of sterling, honest, and useful work, and of practical results effected by the Botanic Garden, that the Governor-General, finding at the same time that it was supported by a native endowment, was compelled to abandon the threatened decree for the abolition of the institution, and the Saharunpore Garden was saved. For this service Dr. Royle is entitled to the enduring gratitude of all Indian naturalists. In 1831 he returned to Europe with a large and valuable collection of materials. With characteristic energy he threw himself at once upon the investigation of what he had amassed, and between that period and 1840 he devoted himself chiefly to the publication of his great work, the "Illustrations of the Botany and other branches of the Natural History of the Himalaya Mountains," which is distinguished alike by a very large amount of original information, and by the most comprehensive, exact, and useful research. He became a member of all the leading scientific societies of the Metropolis. His election as a Fellow of the Linnean Society dates from 1833; and in the same year he read a Paper "On the *Lycium* of Dioscorides," which is printed in the 17th volume of our 'Transactions.' About the same time he received from the University of Munich the diploma of a

Doctor of Medicine ; and in 1837 he became a Fellow of the Royal Society, of which he was afterwards for a time a Vice-President. He also became a Fellow of the Geological Society, in which for several years he filled the office of one of its Secretaries ; latterly, for several years, he was Secretary of the Horticultural Society, in the business and well-being of which he always took the most lively and active interest ; and for several of the later years of his life he was Secretary of the British Association for the Advancement of Science. The signal success with which he had studied the *materia medica* of the East led to his being appointed to fill the chair of that branch combined with Therapeutics, in King's College, when vacated by the late Dr. Paris ; and the introductory lecture to his first course in that institution formed the basis of an essay "On the Antiquity of Hindoo Medicine," published in 1837. About the same time he was united in marriage to a lady of highly cultivated intellect, daughter of the late Edward Solly, Esq., who became the earnest and competent partner of all his subsequent labours : never was a man of science more fortunate in his domestic ties. In 1840 he published an "Essay on the Productive Resources of India," a work of high importance in an economical point of view, and the basis of all that has since been written on the subject. In 1844, being Dean of the Faculty of Medicine at King's College, he was requested to publish his introductory lecture "On Medical Education ;" and in 1847 he published, in a thick 12mo volume, for the use of his pupils, "A Manual of *Materia Medica* and Therapeutics," which became widely popular, on account of the unusual pains taken in the elaboration of the botanical and commercial history of the various substances. A second edition was published in 1853, and a third in 1856, both in 8vo, the last "revised and enlarged by F. W. Headland." In the changes which took place in the Royal Society about the year 1847, he took an active part, and was one of the founders of the Philosophical Club, established in that year. Besides the societies connected with the cultivation of natural science, he took an active share in the business of the Royal Asiatic Society, and with habitual energy soon struck out a new branch of inquiry in it. The 'Transactions' of that learned body had hitherto been directed chiefly to the languages, history, mythology, archaeology, and numismatics of the East. At the instance of Dr. Royle, a committee was organized for the investigation of the productive resources of India, and a series of valuable communications upon interesting commercial objects, either

new or but imperfectly known, emanating from Dr Royle, was the result. The commercial interest of the manufacturing districts was naturally awakened to these raw products; and the India-house became exposed to inquiries upon the subject, to which no department of that great establishment was at the time competent to give a reply. The natural and inevitable result soon followed: an office, that of "Correspondence relating to the Vegetable Productions of India," was created for Dr. Royle, who had now resigned his medical appointment; and Leadenhall Street henceforth became the centre of his labours and public usefulness. From this time forward he devoted his whole attention to the development of the productive resources of the country of his birth. Having the entire charge of the correspondence in relation to this most important subject, he was naturally one of the first to be consulted with regard to the Indian Department of the Great Exhibition of 1851, on which he furnished a valuable memoir, which was published in the Appendix No. 3 to the Preliminary Report of the Commissioners. In the management of this Exhibition he was appointed one of the Local Commissioners for the City of London, and had the entire charge of the Indian department. The results of his labours on this occasion are too well known to render it necessary to dwell on the skill, energy, and taste which presided over its organization and arrangement. When the Great Exhibition of Paris took place in 1855, he was again selected to superintend the Oriental department, which was, by his exertions, placed on a scale of truly oriental magnificence. For his eminent services on this occasion he received from the Emperor the large honorary medal, together with the decoration of an Officer of the Legion of Honour. Once again his talents were called into requisition in a similar manner, in the organization of the Indian Collection at the Exhibition of Art-Treasures in Manchester in 1857. In the meantime, although so busily occupied in these exhibitions and in the ordinary duties of his office, he had published in 1851 an elaborate work "On the Culture and Commerce of Cotton in India and elsewhere," and had contributed a series of Articles to the 'Penny Cyclopædia,' and to Dr. Kitto's 'Cyclopædia of Biblical Literature,' and numerous Notices in different Journals, besides Lectures at the Society of Arts and elsewhere, among which were two on the Results of the Great Exhibition, "On the Arts and Manufactures of India," "On Indian Fibres, &c." This latter, when the war with Russia threatened to cut off our supply of the principal fibrous materials

for the navy, was expanded into an important work, entitled "The Fibrous Plants of India, fitted for Clothing, Cordage, and Paper: with an account of the Cultivation and Preparation of Flax, Hemp, and their Substitutes," Lond. 8vo, 1855. The immense collections of Indian products, raw and manufactured, many of the latter of great interest either as fabrics or as exquisite models of design, which had been brought together with a view to these several exhibitions, afforded Dr. Royle an opportunity of pressing upon the authorities of the India House the importance of forming a museum in Leadenhall Street, where they might be collectively exposed for the benefit and instruction of the public. The plan was adopted; and to carry it out became the great object of the last year of his laborious and valuable life. He survived to see the rooms filled, and most of the specimens laid out. The day before his death, after an interval of confinement for some weeks, he was again at his post, to urge on the final arrangements of the museum; but mortal disease was then upon him, and on the following morning he was carried off by a sudden stroke. He died at his residence, Heathfield Lodge, Acton, on the 2nd of January in the present year, and in the fifty-ninth year of his age, leaving a widow, two sons, and a daughter to bemoan his loss, and a deep-seated sentiment of respect and regret among a wide circle of friends.

It would be unjust not to mention, that in the preparation of this notice I have been largely indebted to the kindness of my friend Dr. Falconer, who succeeded Dr. Royle in the charge of the Botanic Garden at Saharunpore, and was through life one of his warmest and most intimate friends.

Joseph Smith, Esq., F.R.S., well known to many of us as having filled for a considerable period the office of Treasurer of the Royal Society Club, was called to the Bar as a Member of Gray's Inn, within the precincts of which he continued to live during the remainder of his life, and where he died on the 26th of May 1857, at the age of eighty-three. He became a Fellow of the Linnean Society in 1811, and of the Royal Society in 1819, and was a constant attendant at the meetings of the latter, until the infirmities of age precluded his appearance abroad. He was well acquainted with British plants, and wrote a memoir on the Guernsey Lily, which however has not been published.

The Rev. William Smith, Professor of Natural History in Queen's College, Cork, was the fifth son of the late Samuel Smith, Esq., of Balmamere, near Ballymoney, in the county of Antrim,

and was born on the 12th of January 1808. He received his collegiate education in the Royal Belfast Academical Institution, and, devoting himself to the ministry, attached himself first to the Presbytery of Antrim, and afterwards to the Remonstrant Synod of Ulster. At a very early period of life he was chosen minister of the Unitarian congregation of Dundee, whence, after the lapse of a few years, he removed to Bolton in Lancashire, and subsequently to Stockport, where he continued in the exercise of his ministerial functions from 1834 to 1845. Compelled by his health to seek a milder climate, he became successively pastor of the congregations in Torquay, Jersey, Cheltenham, Wareham, and Lewes; and towards the end of 1854 he was appointed, on the recommendation of the late Professor Edward Forbes, to the Chair of Natural History at Cork, which he occupied till his decease. He was for many years a martyr to the gout; but his ailment, although severe, did not preclude the application of his mind to study; and in the pursuit of natural history, to which he had been addicted from his youth, he found both solace from pain and a pleasing occupation. Although well-versed in the knowledge of British plants generally, he determined to restrict his more immediate studies to one particular group; and his fondness for microscopical investigation led him to select the *Diatomaceæ* as the family to which his attention should be especially devoted. Accordingly he published, in 1853 and 1856, two crown 8vo volumes, entitled "A Synopsis of the British Diatomaceæ," illustrated by sixty-nine plates, containing figures of nearly four hundred species of that singular group. The specimens which formed the materials for this work are now deposited in the British Museum, and constitute a striking memorial of his industry in collecting, and patience in determining, objects so minute, but at the same time so curious and interesting. As a professor, he soon became exceedingly popular, and his class was one of the most successful in the college; but his health had long been declining, and he died on the 6th of October last, after having occupied the chair only about three years, in the fiftieth year of his age. He became a Fellow of the Linnean Society in 1847.

Richard Horsman Solly, Esq., was the eldest son of Samuel Solly, Esq., F.R.S., F.S.A., of Serge Hill, near Abbots' Langley, Herts, and was born on the 29th of April, 1778, at the house of his father in Great Ormond Street, which he himself continued to inhabit until the close of his life. Mr. Samuel Solly was originally a very considerable merchant in the Italian and Levant

trade, and inherited from his uncle, Mr. Timothy Holles, the house in Great Ormond Street, together with a handsome legacy and a museum of curiosities, which descended to our late Fellow, and contributed, no doubt, to awaken in him that taste for natural and physical science, and that spirit of inquiry by which he was through life distinguished. His mother was one of the two daughters and co-heiresses of Dr. Horsman, an eminent London physician; and his school-days were passed at Cheam in Surrey, under the tuition of Mr. Gilpin, son of the celebrated author of the work on "Forest Trees." He became a student of Magdalen College, Cambridge, where he took his degree of M.A. in the year 1800, and was subsequently called to the bar as a member of Lincoln's Inn. On the death of his father in 1807, he succeeded to a considerable property, and devoted himself thenceforward to the indulgence of his inclination for the pursuits of science and art, and to the cultivation of friendly relations with those who were most eminent in both. He became in the same year a Fellow of the Royal Society, and was early led, by his intimacy with the late Mr. Thomas Andrew Knight, at whose house at Downton he was a frequent visitor, to take a warm interest in the Horticultural Society, of which he continued through life to be an active supporter. He was also for many years an assiduous promoter of the Society of Arts and of the Royal Institution; and became a Fellow of the Society of Antiquaries, the Geological, the Zoological and numerous other Societies. But the subject which more than any other attracted his attention, was the improvement of the microscope; and his patronage and encouragement were liberally bestowed on those able opticians who contributed so greatly, some twenty or thirty years since, to the perfection of an instrument, the importance of which in scientific investigation is daily becoming more widely acknowledged. To this recognition was subsequently due the formation of the Microscopical Society, of which Mr. Solly, notwithstanding his strong predilection for microscopical studies, became a somewhat reluctant member, inasmuch as he felt that the microscope was simply an instrument of research in various branches of science, each of which was already provided with its own appropriate Society. Of the Linnean Society he became a Fellow in 1826, and was frequently a member of our Council, in which his business habits and the activity of his mind rendered him peculiarly useful, especially in relation to financial questions. To him we are chiefly indebted for the clearness and simplicity of our balance-sheet and especially of that

portion of it which relates to our assets and liabilities ; and as a last proof of his good-will and of the warm interest which he ever took in our affairs, I have to record that he has bequeathed to us by his will a legacy of a hundred pounds, of which his executors have courteously announced the speedy payment. To many of us he has been so long known by his constant attendance at our meetings, both scientific and social, by his liberal hospitality, by the kindness of his disposition, and by that spirit of universal good-will which he both felt and inspired, that his loss will leave a marked vacancy in the ever-narrowing circle of our older friends. He died at his house in Great Ormond Street on the 31st of March in the present year, having nearly completed the 80th year of his age, and was buried on the 7th of April in the New Cemetery at Woking, Surrey.

The Rev. William Stockdale, M.A., second in seniority on the list of our Members, having been elected a Fellow of the Linnean Society in the year 1796, died on the 27th of February in the present year, at Mear's Ashby Hall, near Northampton, in the 91st year of his age. He had been for forty-four years vicar of East Ashby, and for nearly sixty-two years a Fellow of the Linnean Society. For many years past I have received from him, at each recurrence of this Anniversary, a letter expressing his warm sympathy with the Society, and occasionally enclosing a botanical specimen with a query attached to it, evincing his continued interest in its pursuits.

William Wood, Esq., F.R.S., was born in Kendal in the year 1774, and was educated for the medical profession. Having completed his studies at St. Bartholomew's Hospital, in London, under the tuition of Abernethy, he commenced practice as a surgeon at Wingham, in the neighbourhood of Canterbury. Attaching himself early to the study of Natural History, he became in 1798 a Fellow of the Linnean Society ; and published, in 1801, in the sixth volume of our 'Transactions,' a useful Paper entitled "Observations on the Hinges of British Bivalve Shells," carefully illustrated by figures from the pencil of Mr. Henry Boys, also an early Fellow of the Society, and still, I believe, living at Toronto in Canada West, of the University of which city he has long been one of the Professors. About 1801 Mr. Wood removed to London, where he continued to practise his profession until 1815, when he entered into business as a bookseller in the Strand, dealing chiefly in books of Natural History, and publishing some important works in that department of Science. He had pre-

viously, in 1812, become a Fellow of the Royal Society, and had given to the world an English translation of Buffon's "Natural History," and a work entitled "Zoography, or the Beauties of Nature displayed in select Descriptions from the Animal and Vegetable, with additions from the Mineral Kingdom," in three vols. 8vo. 1807-1811. In 1815 he published the first volume of a work, entitled "General Conchology;" but this intended work subsequently gave place to his "Index Testaceologicus, or a Catalogue of Shells, British and Foreign, arranged according to the Linnean System," commenced in 1818, and completed in 1828. Of this work, containing about 3000 coloured figures of shells, "a new and entirely revised edition" was published by Mr. S. Hanley in 1855. The success of this 'Conchological Index' induced Mr. Wood to publish, in 1839, on a similar plan, an "Index Entomologicus, or a complete illustrated Catalogue, consisting of 1944 figures, of the Lepidopterous Insects of Great Britain," of which also a second edition, "with figures of the newly discovered species," was given in 1852 by Mr. Westwood. In the meantime he had also published "Illustrations of the Linnean Genera Insecta," in two vols. 12mo, London, 1821; a new edition of Gustavus Brander's "Fossilia Hantoniensia," 4to, London, 1829; and three 4to parts of "A complete Illustration of the British Freshwater Fishes, with some account of their Habits." He quitted business in 1840, and since that time has continued to reside at Ruislip in Middlesex, at which place he died on the 26th of May, 1857, in the 84th year of his age, and in the 60th year of his Fellowship of the Linnean Society. Since his retirement from business he has been but rarely seen among us; but this brief outline of his industrious and useful career will recall to many of our older Fellows the remembrance of an honourable and estimable man, who laboured earnestly for the promotion of natural science. He has left a son, who succeeded him in business, but also retired a few years ago, and who, it is but justice to add, has considerable talent as an artist, and had no small share in the production of some of his father's publications, and especially of the two Indexes above-mentioned.

Among FOREIGN MEMBERS our losses have been heavy, amounting to no less than five:—

Charles Jules Laurent Lucien Bonaparte was the eldest son of Lucien Bonaparte, brother of the first Napoleon, by his second marriage with Alexandrine de Bleschamps. He was born at Paris

on the 14th of May, 1803, and in 1804 accompanied his father into Italy, and was with him in 1810 on board the vessel in which he made his unsuccessful attempt to proceed to America. Being taken prisoners on their passage by an English cruiser, Lucien and his family were brought to this country, where they passed several years in the neighbourhood of Ludlow, where the young Charles first betrayed that taste for natural history by which he was afterwards so eminently distinguished. After the conclusion of the peace of 1814, Lucien returned to Italy, and acquired by purchase from the Apostolic Chamber the principality of Canino, in the neighbourhood of Viterbo, while his son Charles took the title of Prince of Musignano. Residing at Rome for the next seven years, the young Prince devoted himself with great ardour to the study of natural history, successively taking up plants, insects, and vertebrated animals, and finally attaching himself especially to the class of Birds, which continued through life to be his favourite study. In 1822 he married, at Brussels, his cousin Zenaide, the eldest and only surviving daughter of his uncle, Joseph Bonaparte, who was then residing, under the title of Count de Survilliers, in the United States, whither Charles Lucien also soon after proceeded with his youthful bride, and took up his residence in the neighbourhood of his father-in-law. Here, in 1824, he published the first volume of his continuation of Wilson's 'American Ornithology,' which was followed by two other volumes in 1828, and by a fourth in 1833. This important work, together with the "Genera of North American Birds," published in the 'Annals of the Lyceum of Natural History of New York,' in 1826 and 1827, at once established his reputation as a systematic zoologist, and gave evident proof both of his extensive knowledge of the subject, and of the unwearied industry with which he pursued it. In 1827 he came to England, and was elected, at the early age of 24, a Foreign Member of the Linnean Society. On his return to Rome in the following year, he commenced the formation of a splendid zoological cabinet, and soon after issued the first numbers of a magnificent work entitled "*Iconografia della Fauna Italica per le quattro classi degli Animali Vertebrati*," three vols. 4to, Rome, 1832-42, which forms unquestionably the most complete and elaborate work that is extant on the Vertebrated Fauna of any country in the world. In 1837 he again visited England, and communicated to our Society "A new Systematic Arrangement of Vertebrated Animals," which was published in the eighteenth volume of our 'Transactions,' and contained many valuable

suggestions in regard to the classification of the *Vertebrata*. On the principal element of the primary subdivisions of the class *mammalia* first promulgated in this paper, Professor Owen has recently remarked in our 'Journal,' "that he considers it as the most important improvement in the classification of *mammalia* which has been proposed since the establishment of the natural character of the *Implacental* or *Ovo-viviparous* division." From this time the Prince became a frequent visitor at the meetings of the British Association for the Advancement of Science; and so strongly was he impressed with the advantages derived from such meetings, that he laboured long and successfully in the foundation of a similar Association in Italy, the first meeting of which took place at Pisa, in 1839, where and at the subsequent meetings, until 1847, he was constantly President of the Zoological Section, to which he made many interesting communications. By the death of his father in 1840, he succeeded to the title of Canino; and in 1844 he was elected a Corresponding Member of the Academy of Sciences of the French Institute. He continued to reside at Rome, occupying himself incessantly with zoological subjects, until the political events of 1847 rekindled in Italy the revolutionary spirit, when he threw himself ardently into the Republican cause, and became President of the Roman Constituent Assembly, which position he retained until the Roman Republic fell before the arms of France. Proscribed in Italy, he retired first to England, but finally took up his residence at Paris, frequently, however, visiting this country, especially with a view to the meetings of the British Association. For some years past he had suffered severely from swellings and ulceration of the legs, which at last terminated in dropsy of the chest, of which he died, after much suffering, at his house in the Rue de Lille, at Paris, on the 30th of July, 1857, in the 55th year of his age. By his wife Zenaide, who died in 1854, he had twelve children, nine of whom survive him. The number of his works and papers comprised in the list of the 'Bibliographia Zoologiæ' of the Ray Society, amounts to forty-nine; but these extend no lower than 1842, and consequently contain none of his later zoological writings. The production of a complete "Systema Avium" was the great object of his ambition; and at this he laboured indefatigably, notwithstanding his sufferings, to the last hour of his life. The portions relating to *Insectores* and *Grallatores* are already published, and the remainder is left in MS. ready for publication. A special work, in continuation of Temminck's splendid Monograph of

Pigeons, of which several numbers have been published, occupied him up to the time of his death. This extreme ardour in the pursuit of science, and the unremitting attention which he devoted to it, increasing even as his physical powers gave way, were his most striking characteristics. Confining himself to Vertebrated zoology, and especially conversant with the class of Birds, which few men have studied more successfully, his labours have contributed largely to our knowledge of the faunas of Europe and of North America in particular, to the improvement of their systematic arrangement, to the establishment of many well-marked genera, and to the distinction and description of a multitude of new or imperfectly-known species. Of his conduct in public life it is not my business to speak; but I only echo the general sentiment in saying that in private he was amiable and estimable, a warm friend, and an agreeable companion.

Martin Heinrich Karl Lichtenstein, Doctor of Medicine and Philosophy, Member of the Royal Academy of Sciences at Berlin, Director of the Zoological Museum, and Professor of Zoology in the University of that city, was born at Hamburg, on the 10th of January, 1780. He devoted himself to the study of medicine, and took his Doctor's Degree at Helmstadt in 1801. In the following year he became tutor to the children of General Janssen, the Dutch Governor of the Cape of Good Hope, and accompanied him, partly in that capacity and partly as his physician, to Southern Africa. Soon after his arrival, he was made Surgeon-Major in the battalion of Hottentot Light Infantry, raised for the Dutch service, and was appointed in 1804 one of the Commissioners for visiting several then unknown parts of the interior, on missions connected with the outbreak of the war with the native races. In this capacity he was enabled to collect a great amount of information relative to the geography and natural history of the regions which he visited, and in particular to gratify that ardent inclination for zoological investigation which had become his ruling passion. After the capture of the Cape by the English, he returned to Holland with his patron, bringing with him large collections and other materials, on which he laboured for several years, and having settled at Berlin in 1810, commenced his academical career in the following year as ordinary Professor of Zoology in the University. The narrative of his African Travels, published under the title of 'Reisen im Südlichen Africa,' two vols. 8vo, Berlin, 1810-12, added greatly to the reputation which he had already acquired, and was speedily translated into English

and other European languages. In 1815 he was appointed First Director of the Zoological Museum; and in that capacity published, in 1816, an 8vo volume, entitled 'Das Zoologische Museum der Universität zu Berlin;' and in subsequent years a series of Catalogues under the title of "Verzeichniss der Dubletten des Zoologischen Museums, &c.," in which many new species, especially of birds, were from time to time described. His "Darstellung neuer oder wenig bekannter Säugethiere in Abbildungen und Beschreibungen," a splendid folio work, published at Berlin from 1827 to 1829, contains figures and descriptions of many important animals from the collection of the Berlin Museum; and a multitude of other works and essays in the 'Transactions' of the Berlin Academy, in Wiegmann's 'Archiv,' and in other periodicals, attest his continued attention to his favourite pursuit nearly to the close of his long and useful life. Among these, not the least interesting and instructive are his Commentaries on Margrave and Piso, and on Hernandez, in which he has not only ably illustrated the labours of those early pioneers of American zoology, but has added much valuable information derived from the study of the important collection of which he had the principal charge. In 1826 he received the order of the Red Eagle; in 1835 he was elected a Foreign Member of the Linnean Society; and he died suddenly, at Berlin, in September last, having nearly completed his 78th year.

Johannes Müller, M.D., Professor of Anatomy in the University of Berlin, Member of the Royal Academy of Berlin, Foreign Member of the Royal Society of London, and Correspondent of the French Institute, was born at Coblenz, on the 14th of July 1801, became Professor at Berlin in 1831, Foreign Member of the Linnean Society in 1837, and died at Berlin of an apoplectic stroke on the 28th of April of the present year, in the 57th year of his age. The news of the death of this great physiologist is so recent, that I must entreat the Society to excuse my not having prepared a sketch of his life, which has had too great an influence on the existing state of science to be treated of without due consideration.

Christian Gottfried Nees von Esenbeck, President of the Imperial Academy "Naturæ Curiosorum," was born on the 14th of February 1776, and educated at the Pædagogium of Darmstadt, where he first imbibed a taste for the pursuit of natural history. He studied medicine at the University of Jena, where he took his Doctor's Degree, and afterwards established himself as a practising physician at Frankfort-on-the-Maine. His first botanical publication,

'Die Algen des süßen Wassers nach ihren Entwicklungsstufen dargestellt,' Bamberg, 1814, 8vo, was speedily followed by a much more important work in 4to, entitled 'Das System der Pilze und Schwämme,' Würzburg, 1816. By these works he became so favourably known, that in 1818 he was appointed Ordinary Professor of Botany, and Director of the Botanic Garden of the University of Erlangen, where he published, as an introduction to his first course of lectures, a 'Synopsis specierum generis *Asterum* herbacearum, præmissis nonnullis de *Asteribus* in genere, earum structura et evolutione naturali,' Erlangæ, 1818, 4to, which he enlarged in 1832 into a much more important book on the same subject, under the title of 'Genera et Species *Asterearum*,' Vratislaviæ, 8vo. In the same year, 1818, he was appointed editor of the 'Nova Acta Academiæ Cesariæ Leopoldino-Carolinæ Naturæ Curiosorum,' the direction of which he retained, as President of the Academy, until his death. In 1819 he became Ordinary Professor of Natural History in the University of Bonn, where he laboured assiduously, in conjunction with his scarcely less celebrated brother, Theodor Friedrich Ludwig, in the establishment of an excellent botanic garden, and where his lectures were in high repute, until 1831, when he was transferred to the Botanical Chair of the University of Breslau. Professor Nees von Esenbeck was not only one of the most laborious, but also one of the most distinguished systematic botanists of the present century. His principal botanical publications, besides those already mentioned, are his 'Handbuch der Botanik,' in two vols. 8vo, Nürnberg, 1820-1; his 'Agrostologia Brasiliensis,' forming the second volume of Professor Von Martius's intended 'Flora Brasiliensis,' 8vo, 1829; his 'Cyperaceæ Brasilienses;,' his 'Naturgeschichte der Europäischen Lebermoose,' four vols. 8vo, 1833-38; his 'Systema Laurinearum,' 8vo. 1836; the "Acanthaceæ" of DeCandolle's 'Prodromus;,' and his "Monograph of the East Indian *Solanææ*," printed in the seventeenth volume of our 'Transactions.' Besides these, he assisted largely in several important works, published by his brother and other writers, and wrote numerous papers in the 'Nova Acta,' and elsewhere. It is not, however, as a botanist only that he deserved well of natural history; as an entomologist also he is well known by his extensive series of researches on the family of *Ichneumonidæ* and their allies, of which his 'Monographie der Ichneumoniden,' two vols. 8vo, Stuttgart, 1828, and his 'Hymenopterorum Ichneumonibus Affinium Monographiæ,' two vols. 8vo, Stuttgart, 1830, contain the

most complete *résumé*. But perhaps the greatest service that he rendered to natural science was in the revival of the German Academy *Naturæ Curiosorum*, after a repose of twenty-seven years, and the skill and industry which, for a period of forty years, he bestowed upon the superintendence of the highly important series of its 'Transactions' from the ninth to the twenty-fourth volumes. He became a Foreign Member of the Linnean Society in 1827, and communicated to us, in addition to the paper previously mentioned, "A Descriptive Catalogue of the *Gramineæ* and *Cyperaceæ* contained in the Indian Herbarium of Dr. Royle," the characters of the new genera contained in which are given in the first volume of our 'Proceedings.' He died at Breslau at the commencement of the present year, in the 82nd year of his age.

Conrad Jacob Temminck, Member of the Royal Academy of Sciences of the Netherlands, and one of the most distinguished ornithologists of the present century, was born at Amsterdam, of a good family, on the 31st of March 1778. His father, Jacob Temminck, was Treasurer of the East India Company; and he was himself destined for a mercantile career, his friends obtaining for him, at the age of 17, an appointment as one of the *Vendu-masters* to the Company. In this capacity he had many opportunities of making himself acquainted with the numerous objects of natural history brought home by the Company's ships. He had also the advantage of studying a small collection of birds made by his father, whose taste for natural history led him to give such recommendations and other assistance to *Levaillant* in his voyage to the Cape of Good Hope, as induced the latter to dedicate to him the first volume of his '*Oiseaux d'Afrique*.' Many of the specimens of birds brought home by *Levaillant*, and still extant in the Museum at *Leyden*, were prepared by the younger *Temminck*, who acquired great skill in the preservation of the remains of animals, and especially of fishes, his mode of preparing which became afterwards celebrated under the name of *Temminck's method*. His intimacy with *Levaillant* contributed in no small degree to increase his taste for natural history, and is supposed to have given him that facility in the use of the French language, both in speaking and writing, which was so useful to him in after-life; but his chief instructor in natural science was *Bernhard Meyer*, the *collaborateur* of *Wolf* in the well-known '*Taschenbuch der Deutschen Ornithologie*,' with whom he was united by ties of the closest friendship. For some time he busily occupied himself in the formation of a fine collection of birds and

quadrupeds, and first appeared in the character of a writer in a 'Catalogue Systématique du Cabinet d'Ornithologie et de la Collection de Quadrumanes de C. J. Temminck; avec une courte description des Oiseaux non-décrits.' His next appearance in print was as the author of the text of the first volume of the splendid work of Madame Knip, 'Histoire Naturelle des Pigeons,' Paris, 1808, which was followed by his 'Histoire Naturelle Générale des Pigeons et Gallinacés,' Paris, 1813-15, three vols. 8vo. These works established his reputation as one of the most accurate and laborious of systematic ornithologists, and recommended him to the notice of the then existing government. King Louis appointed him one of his Chamberlains, and decorated him with the Order of Union, which he had just established. After the expulsion of the French, when the peace of Europe was again threatened, he became for a short time Captain of a volunteer corps of cavalry formed in Amsterdam; but these distractions withdrew him only for a short time from his favourite pursuits. In 1815 he published, in one vol. 8vo, his 'Manuel d'Ornithologie, ou Tableau Systématique des Oiseaux qui se trouvent en Europe,' which was afterwards expanded into four vols. 8vo, Paris, 1835-40, and was illustrated by an atlas by Werner, containing figures of nearly all the birds described. In this, which must be regarded as one of his most important works, he attempted to establish a system differing in many respects from those which had preceded; but the accuracy of the descriptions, the extent and careful elaboration of the synonymy, the detailed observations on the habits and change of plumage of the birds, and the attention paid to their geographical distribution especially distinguish this Manual as a most valuable contribution to Ornithological Science. His next great work, for which he had long been preparing, was commenced in 1820, and completed in 1844, under the title of 'Nouveau Recueil de Planches Coloriées d'Oiseaux,' intended as a supplement to the 'Planches Enluminées' of Buffon, and containing 600 splendid folio plates. The name of Baron Meiffren-Laugier is associated with his on the title; but it is well known that the Baron had no share in the scientific elaboration of the work. In the same year in which he commenced this great work, he was named, on the death of Brugman, Director of the Natural History Museum at Leyden, to which he transferred his own extensive collection, and which, under his superintendence, became in a few years equal in many respects, and in some superior, to the principal Museums in other states of Europe. The

formation of this immense collection and the publication of his great ornithological work did not, however, so completely occupy his time as to preclude him from giving some portion of his attention to the study of the mammalia; and his two volumes of 'Monographies de Mammalogie,' published in 4to at Paris and at Leyden, between 1825 and 1841, attest the extent of his acquirements in that department of Zoological Science. His original predilection for everything connected with the East Indies had been strengthened and renewed by the acquisition and description of a multitude of zoological novelties from the Dutch possessions in the Eastern Islands, and was strongly evinced in his work entitled 'Coup d'œil général sur les Possessions Néerlandaises dans l'Inde Archipélagique,' 3 tom. 8vo, Leide, 1847-9. Nor must I omit to mention the splendid work, in three volumes folio, published under his superintendence, chiefly by the officers of the Leyden-Museum, under the title of 'Verhandelingen over de natuurlijke Geschiedenis des Nederlandsche overzeesche bezittingen,' or the important aid given by him to the 'Fauna Japonica' of Von Siebold, likewise published under his direction. His last work, published at Leyden in 1853 and the two following years, under the title of 'Esquisses Zoologiques sur la côte de Guinée,' affords conclusive evidence that, at the age of 77, his industry was undiminished, his faculties were unimpaired, and he continued to enjoy uninterrupted good health; but in the course of that year it became evident that his health was suffering, and he died on the 30th of January in the present year, having nearly completed his 80th year. He was thrice married, and has left a widow and three sons by his last marriage. On his first visit to England, in 1819, he laid before our Society "An Account of some new species of Birds of the genera *Psittacus* and *Columba*, in the Museum of the Linnean Society," the greater part of which, he states, were brought from the south, east, and north coasts of New Holland by Mr. Brown, who communicated much useful information derived from his notes. This valuable memoir was published in the thirteenth volume of our 'Transactions;' and in the following year, 1820, M. Temminck was elected a Foreign Member of the Linnean Society. Besides the honours which he received in his own country, he was a Correspondent of the Academy of Sciences of Paris, of the Royal Academy of Sciences of Berlin, of the Imperial Academy of St. Petersburg, and of many other scientific bodies. He had also received the decorations of the Lion of the Netherlands, of the Legion of Honour, and of the

Portuguese Order of the Conception. Many of his detached memoirs, in addition to the more important works above quoted, will be found in the 'Annales Générales des Sciences Physiques,' in the 'Bijdragen tot de Natuurkundige Wetenschappen,' in the 'Tijdschrift voor Natuurlijke Geschiedenis,' and in the 'Proceedings of the Zoological Society.'

The Secretary also announced that twenty Fellows, two Foreign Members, and one Associate, had been elected since the last Anniversary.

At the election which subsequently took place, Thomas Bell, Esq., was re-elected President; Francis Boott, Esq., M.D., Treasurer; John Joseph Bennett, Esq., Secretary; and George Busk, Esq., Under- (Zoological) Secretary. The following five Fellows were elected into the Council in the room of others-going out:—viz. Charles Cardale Babington, Esq.; William Benjamin Carpenter, Esq., M.D.; Charles Darwin, Esq.; Daniel Hanbury, Esq.; and S. James A. Salter, Esq., M.B.

The President nominated Francis Boott, Esq., M.D.; Robert Brown, Esq., D.C.L.; Richard Owen, Esq., D.C.L.; and William Wilson Saunders, Esq., Vice-Presidents for the ensuing year.

In pursuance of the Resolution of the Special General Meeting of June 17th, 1856, the Council, on the 24th of June, 1856, invited the Members to enter into a subscription for defraying the expenses attendant on the Society's removal to Burlington House; and the Treasurer now reported the following

LIST OF SUBSCRIBERS.

Thomas Bell, Esq. (<i>President</i>).			£50	0	0		
	£	s. d.		£	s. d.		
Adams, H., Esq.	2	2	0	Bennett, J. J., Esq. (<i>Secretary</i>)	20	0	0
Alexander, R. C., Esq., M.D.	10	0	0	Bentham, G., Esq.	20	0	0
Ansell, T., Esq., M.D.	2	2	0	Bentley, R., Esq.	5	0	0
Archer, W., Esq.	5	0	0	Blackwall, J., Esq.	10	0	0
Ashton, R. J., Esq.	5	0	0	Boott, F., Esq., M.D., V.P. (<i>Treasurer</i>)	20	0	0
Atkinson, W., Esq.	5	5	0	Borrer, W., Esq.	10	0	0
Babington, C. C., Esq., M.A.	5	0	0	Botfield, B., Esq.	20	0	0
Baird, W., Esq., M.D.	1	1	0	Bowerbank, J. S., Esq.	20	0	0
Barlow, Rev. John, M.A.	5	0	0				
Bedingfeld, Rev. J.	1	1	0				

£	s.	d.	£	s.	d.
Brisbane, Gen. Sir T. M.,			Howson, Rev. J., M.A.	2	2 0
Bart.	10	0 0	Hudson, R., Esq.	20	0 0
Brooke, H. J., Esq.	5	0 0	Iliff, W. T., Esq., M.D.	1	1 0
Brown, R., Esq., D.C.L.,			Janson, T. C., Esq.	11	4 0
V.P.	20	0 0	Jesse, J., Esq.	5	0 0
Brydges, Sir H. J. J., Bart.	10	0 0	Jones, J. D., Esq., M.D.	1	1 0
Buccleuch, H. G. the Duke			Kennedy, B., Esq.	5	0 0
of	20	0 0	Kippist, R., Esq.	5	0 0
Buckton, G. B., Esq.	10	10 0	Lance, J. H., Esq.	2	2 0
Burchell, W. J., Esq., D.C.L.	5	0 0	Lindley, J., Esq., Ph.D.	20	0 0
Busk, G., Esq.	10	10 0	Lyell, Sir C., M.A., D.C.L.	6	0 0
Cantley, Sir P. T., K.C.B.	5	0 0	M'Andrew, R., Esq.	10	0 0
Christy, H., Esq.	20	0 0	Mallard, Lieut. C., R.N.	5	0 0
Collingwood, C., Esq., M.A.	1	1 0	Mann, T. W., Esq.	2	2 0
Couch, J., Esq.	0	10 0	Miers, J., Esq.	20	0 0
Cuming, H., Esq.	5	0 0	Miles, Rev. C. P., M.A.	5	0 0
Currey, F., Esq.	2	2 0	Mitchell, D. W., Esq.	1	1 0
Darwin, C., Esq., M.A.	20	0 0	Morson, T. N. R., Esq.	5	0 0
Daubeny, C. G. B., Esq.,			Murchison, Sir R. I., D.C.L.	10	0 0
M.D.	5	0 0	Osborn, W., Esq.	3	3 0
Deane, H., Esq.	2	0 0	Owen, R., Esq., D.C.L., V.P.	10	10 0
Dickinson, J., Esq.	20	0 0	Owen, R. B., Esq., M.D.	2	0 0
Dillwyn, L. L., Esq., M.P.	10	0 0	Pamplin, W., Esq.	1	1 0
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June 3rd, 1858.

Thomas Bell, Esq., President, in the Chair.

Woodyer Merricks Buckton, Esq., was elected a Fellow.

The special thanks of the Society were directed to be presented to Professor Andersson, of Stockholm, for his very acceptable present of a cast from the bust of Linnæus (at the age of 64 years) in the Meeting-Room of the Academy of Sciences at Stockholm.

Read, first, a Note "On the death of the Common Hive-Bee, supposed to be occasioned by a parasitic Fungus;" by the Rev. H. Higgins. Communicated by the President. (See "Zoological Proceedings," vol. iii. p. 29.)

Read, secondly, a Paper "On some points in the Anatomy of *Nautilus pompilius*;" by T. H. Huxley, Esq., F.R.S. Communicated by the Zoological Secretary. (See "Zoological Proceedings," vol. iii. p. 36.)

Read, thirdly, "Natural-History Extracts from the Journal of Captain Denham, H.M. Surveying Vessel 'Herald,' 1857, 1858;" Communicated by the Hydrographic Office of the Admiralty. (See "Zoological Proceedings," vol. iii. p. 32.)

Read, fourthly, a "Notice of the discovery of a gigantic species *Equisetum*, upwards of twenty feet high, at Cañaloo in the

Andes of Peru;" by Richard Spruce, Esq. Communicated by Dr. J. D. Hooker, F.L.S.

Read, fifthly, a Note "On the Nidi and habits of a species of *Lumbricus*, found in the London Clay near Highgate;" by J. W. Wetherell, Esq. Communicated by James Yates, Esq., F.L.S. (See "Zoological Proceedings," vol. iii. p. 31.)

Read, sixthly, a "Description of *Amorphopus*, a new genus of *Crustacea*, of the Family of *Pinnotheridæ*;" by Thomas Bell, Esq., President of the Linnean Society.

June 17th, 1858.

Thomas Bell, Esq., President, in the Chair.

The necessary business of the meeting having been disposed of, it was proposed by the President, and unanimously resolved:—

"That in consequence of the recent death of Robert Brown, Esq., Vice-President, and formerly President of the Society, and in consideration of his long connexion with and eminent services to the Society and to Natural Science, the meeting should now adjourn."

In proposing this resolution, the President made the following observations:—

GENTLEMEN,—It becomes my very painful duty to advert for a few moments to the unspeakable loss which has accrued to science in general, and to the Linnean Society particularly, since our last meeting. At that time I could not shut my eyes to the probability that before we should again meet, science and society would be deprived of one who was equally the ornament of both. That event, as you are well aware, has now occurred, and Robert Brown is removed from amongst us. I will not, on such an occasion as the present, attempt to offer you a formal eulogy on one whom you all knew so well, and loved and respected so warmly. I will not dwell upon his unequalled attainments in his favourite science, on the extent and variety of his learning, on his wide and profound research, his acute discrimination, his solid good sense, t

quiet reflective wisdom of his decisions on points of doubt and difficulty,—these and the other qualities of his clear and acute intellect will hereafter have full justice done to them by an abler hand than mine. But I cannot suppress the expression of my deep sorrow at the loss of that warm and kindly heart, that cheerful and genial spirit, those cordial and benevolent affections, and that intense love of justice, which combined to render our departed friend as heartily and warmly loved as he was deeply respected and revered.

One of our lamented friend's latest acts evinced the unfailing interest which he continued to the last to take in the welfare of the Linnean Society. Only a week before his death he placed in Mr. Bennett's hands, to be given up to the Society, the two bonds for one hundred pounds each, which he held as security for two shares of the loan by which we were enabled to purchase the Linnean collection. You will agree with me that such a proof of his attachment, on the near approach of his final separation from us, ought not to be passed over without a grateful record.

I am spared the necessity of detaining you with any longer detail, by the opportunity of referring you to a beautiful and touching notice of his great merits which appears in the 'Times' of this morning, in which you will easily recognize the hand of one of our most valued members, who knew him perhaps better than any other, and by whose unceasing tender and all but filial devotion, his last days and nights were soothed and comforted and cheered. The latest moments of that true and affectionate friend, to what period soever his life may be prolonged, will be brightened by the hallowed reflection of the peace which he brought to the dying hours of him whom he so much loved and revered.

July 1st, 1858.

Special Meeting.

Thomas Bell, Esq., President, in the Chair.

The meeting having been specially summoned for the Election of a Member of Council in place of Robert Brown, Esq., V.P., deceased, George Bentham, Esq., was elected a Member of Council in his place.

The President nominated George Bentham, Esq., to be a Vice-President in the place of Robert Brown, Esq., for the ensuing year.

It was moved by Sir C. Lyell, seconded by Mr. Bennett, and resolved unanimously :—

“That this Meeting desires most emphatically to record its deep sense of the eminent services rendered by the late Robert Brown, Esq., both to the Linnean Society and to Botanical Science, by the entire devotion of a long life and of talents of the highest order, to the promotion of the great objects for which the Society was formed.

“That it looks back with heartfelt satisfaction to the long period of sixty years, during which Mr. Brown was connected with the Society, as an Associate, as Librarian, as a Fellow, as a Vice-President, and as President; and is profoundly sensible of the honour which the Society has derived from its long and intimate connexion with so great a master in Botanical Science.

“That while thus recording its high appreciation of the eminent talents of this great man, and of their successful application to the pursuits of Natural Science, this Meeting cannot refrain from also paying a just tribute to the simple-hearted benevolence of disposition, the high moral purity of mind, and the unswerving rectitude of judgment, which formed the most striking distinctions of his individual character.

“That, influenced by these various considerations, this Meeting deeply deplores the loss which the Linnean Society and Natural Science have sustained by the death of so distinguished, and at the same time so estimable, a man.”

Read, first, a Letter from Sir Charles Lyell, F.L.S., and Dr. J. D. Hooker, F.L.S., addressed to the Secretary, as introductory to the following Papers on the laws which affect the production of Varieties, Races, and Species, viz. :—

1. An “Extract from a MS. work on Species, by Charles Darwin, Esq., F.R.S., F.L.S., &c., sketched in 1839 and copied in 1844.”

2. An “Abstract of a Letter addressed by Mr. Darwin to Professor Asa Gray, of Boston, U.S., in October 1857.”

3. An “Essay on the Tendency of Varieties, &c. to depart

indefinitely from the Original Type," by A. R. Wallace, Esq. (For these Papers, see "Zoological Proceedings," vol. iii. p. 45.)

Read, secondly, "Notes on the Organization of *Pharonis Hippocrepis*;" by F. D. Dyster, Esq., M.D., F.L.S. (See "Transactions," vol. xxii.)

Read, thirdly, "Observations on the Metamorphosis of *Ammocatus*;" by — Highley, Esq. Communicated by the President.

Read, fourthly, a "Description of *Hanburya*, a new genus of *Cucurbitaceæ*;" by Berthold Seemann, Esq., Ph.D., F.L.S.

Read, fifthly, a MS. Memoir by the late Professor Pavon, entitled "Nueva Quinologia;" with observations by John Eliot Howard, Esq., F.L.S.

Read, sixthly, two Letters "On the Vegetation of the Portuguese territories in Western Africa," addressed to William Wilson Saunders, Esq., V.P.L.S., by Dr. Friedrich Welwitsch. (See "Botanical Proceedings," vol. iii.)

ADDITIONS

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[Continued from Vol. II. page lvi.]

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On the Importance of an Examination of the Structure of the Integument of Crustacea in the determination of doubtful Species.—Application to the genus *Galathea*, with the Description of a New Species of that Genus. By SPENCE BATE, Esq., F.L.S.

[Read January 21, 1858.]

Of the various genera of Decapod Crustacea none are more interesting, or more difficult of description, than those which constitute the family Galatheadæ.

The interest attaching to these forms arises from the intermediate position which they occupy in the natural arrangement of the class, their structure placing them between the Macrura and Brachyura; in accordance with which we find that, whilst Professor M.-Edwards classes them among the Macrura, Professor Bell, in his work on the British Crustacea, places them (more correctly, as we think) in the intermediate group of Anomura.

This opinion is fully borne out both in the development of the animals and in their structure in the adult state.

The early form of the larva bears, anteriorly, a resemblance to the Brachyural type, whilst the caudal appendages assimilate to those of the Macrura. The same conditions obtain in the young of Anomura. At the time of birth, the larva, like that of the Brachyura, has only the two gnathopoda developed, whilst the

termination of the tail is like that of a fish, as in the *Macrura*. In the adult, the internal antennæ possess short flagella and complementary appendages, such as exist in the order *Brachyura*, whilst the external antennæ have the long and slender flagella proper to the *Macrura*. The *scale*, however, commonly appended to the external antennæ in the latter order is wanting, a circumstance which exhibits a relation to the *Brachyura*.

An examination of the legs shows that the coxæ are fused with the thorax, as in the *Brachyura*, and not articulated with it as in the *Macrura*, whilst, on the other hand, the posterior division and caudal termination approach the *Macrural* type more nearly than that of the *Brachyura*, the animal thus assuming a character intermediate between the two orders.

But in the description of the several species of the genus *Galathea*, a peculiar difficulty appears to arise, originating in the affinity which they bear to each other. So close, in fact, is the approximation, that the descriptions of the best writers will scarcely avail for the distinction of the individual species without the assistance of figures. This arises from the fact that the general characters, upon which the descriptions are based, vary, in this genus, only in their comparative degrees of development.

In the three species recognized in Professor Bell's work on the British Crustacea, it will be found that each species retains the same characters in greater or less degree.

Galathea strigosa is peculiar for the spinous character of the carapace and cheliform legs. Every spine, however, is repeated in both the other species, only less developed. We find the rostrum furnished with four lateral teeth on each side, a character which also exists in each of the other species; and although close observation may detect a slightly different arrangement in the relative position of these teeth, the differences are not of sufficient importance to enable a naturalist thence to derive a specific distinction, unless the peculiarity is seconded by some more unqualified character less liable to be affected by any peculiarity of condition.

In order to arrive at more certain results in the identification of species, we think that the microscopic examination of the surface of the integument will be found peculiarly useful.

This mode of examination of species may also be applied to a considerable extent throughout the Crustacea generally with great advantage; and if found valuable in recent, there can be no doubt that it will prove of far greater importance in extinct forms, where

parts on which the identification of species usually rests are lost, and fragments only of the animal obtainable.

It should be borne in mind that, as the structure in question undergoes modifications more or less considerable in different parts of the animal, it will always be advisable to compare the corresponding parts with each other.

Applying this test to the known species of *Galathea*, we perceive that the structure of the integument upon the arms, independent of the marginal spines, exhibits a squamiform appearance, but that the scales, which characterize the structure, possess features peculiar to each species.

In *Galathea strigosa* the scales are convex, distant from each other, smooth at the edge, and fringed with long hairs. In *G. squamifera* they are convex, closely placed, scalloped at the edge, and without hairs. In *G. nexa* the scales are obsolete, tufts of hair representing the supposed edges. In *G. depressa*, n. sp., the scales are broad, less convex than in *G. strigosa* and *G. squamifera*, smooth, closely set, and fringed with short hairs. In *G. Andrewsii* they are small, distant, very convex, tipped with red, and slightly furnished with hair.

As another instance of the practical application of the microscopical examination of the surface, I would refer to two species of Amphipoda, classed by Leach under the name of *Gammarus Locusta*, from his inability to assign them any separate specific characters. In the structure of their integuments, however, these two forms will be found to exhibit widely different microscopical appearances.

Again, there exists in the same group three or four species, the description of any one of which would apply to either of the others; and it is probable they would never have been ranked as separate species had not their habitats been geographically distant. Thus *Gammarus Olivii*, M.-Ed., *G. affinis*, M.-E., *G. Kröyii*, Rathke, and *G. gracilis*, R., can only be specifically determined by a microscopical examination of the integument.

The same may be said of other Amphipoda, such as *Urothoe inostratus*, Dana, from South America, which so nearly resembles in form the *U. elegans* of the British shores.

GALATHEA DISPERSA, mihi.

G. rostro brevi, dentibus 4 utrinque ornato, 2 anterioribus minoribus pedibus anterioribus elongatis, sparse spinosis; chelarum digit parallelis.

Galathea with short rostrum, armed on each side with 4 teeth, the two posterior being less important than the two anterior. The fingers of the chelæ impinge through their whole length; outer margin of the hand furnished with 3 or 4 small spines.

Hab. Trawling-ground, Plymouth, common; Moray Frith, Scotland.

This species unites *G. Andrewsii* with *G. nexa*, and, I think, has often been mistaken for the young of the latter; but *G. nexa*, so far as my experience goes, is a species peculiar to the north of England, whereas *G. dispersa*, I anticipate, will be found to be the most universally dispersed, in deep water, of any of the species known. It can always be detected from *G. nexa* by the form of the hand and the manner in which the fingers impinge: in *G. nexa* the hand is broad towards the extremity, and the fingers meet only at the apex; in *G. dispersa* the hand gradually narrows to the apex, and the fingers meet each other through their whole length, the inner margin of the finger being finely serrated, the thumb not.

It also may be distinguished from *G. Andrewsii* by the breadth of the hands, which are narrow and round in *G. Andrewsii*, and moderately broad and flat in *G. dispersa*.

By an examination of the texture of the integument under a magnifying power of low degree, the surface of *G. dispersa* will be seen distinctly to differ from that of any of the others; it is covered with flat scales, fringed with short cilia. The length of the animal, including the arms, is about $2\frac{1}{4}$ inches.

Catalogue of Hymenopterous Insects collected at Celebes by Mr. A. R. WALLACE. By FREDERICK SMITH, Esq., Assistant in the Zoological Department, British Museum. Communicated by W. W. SAUNDERS, Esq., F.R.S., F.L.S.

[Read April 15th, 1858.]

THIS collection of the Hymenoptera of Celebes is specially interesting, as adding greatly to our knowledge of the geographical range of many well-known species, while the additions made to the Fossorial group contain many of great beauty and rarity. A new species belonging to the tribe of Solitary Wasps, *Odynerus clavicornis*, is perhaps the most interesting insect in the collection; this Wasp has clavate antennæ, the flagellum being broadly dilated towards the apex, convex above and concave beneath. I am not acquainted with any other insect belonging to the Vespid group which exhibits such an anomaly.

Fam. ANDRENIDÆ, *Leach.*Gen. SPHECODES, *Latr.*

1. *SPHECODES INSULARIS*. *S. niger*, abdominis segmentis primo secundo et tertio (basi) rubris; alis hyalinis.

Male. Length $3\frac{1}{2}$ lines. Head and thorax black, closely and strongly punctured; the face below the antennæ with silvery-white pubescence; the joints of the flagellum submoniliform; the mandibles ferruginous. Thorax: the tegulæ pale rufo-testaceous, wings hyaline, the nervures ferruginous; the metathorax coarsely rugose; the articulations of the legs and the tarsi ferruginous. Abdomen: the first, second, and base of the third segments red, the apical ones black, very finely and closely punctured, with the apical margins of the segments smooth and shining; a black spot in the middle of the basal segment.

Hab. Celebes.

Gen. NOMIA, *Latr.*

1. *NOMIA PUNCTATA*. *N. nigra nitida punctata*, alis nigro-fuscis.

Male. Length $4\frac{1}{2}$ lines. Shining black: head and thorax coarsely punctured, the metathorax ruggedly sculptured, truncate at the apex, the truncation and sides smooth with a few fine punctures; the abdomen closely and rather finely punctured, the apical margins of the segments smooth and shining. The tips of the mandibles, the tarsi and apex of the abdomen rufo-testaceous, the wings fuscous.

Hab. Celebes.

2. *NOMIA FLAVIPES*. *N. nigra pedibus flavis*, abdomine cinereo fasciato, alis hyalinis.

Female. Length $3\frac{1}{2}$ lines. Black; the face and cheeks densely clothed with short cinereous pubescence, the vertex thinly so; the margins of the prothorax, mesothorax and scutellum with a line of pale ochraceous pubescence, the disk of the thorax thinly covered with short pubescence of the same colour, the emargination of the metathorax as well as its sides with longer pubescence of the same colour; the base of the abdomen and basal margin of the second and following segments covered with short cinereous pubescence. The flagellum beneath fulvous; the mandibles ferruginous. The legs reddish-yellow, with the coxæ and base of the femora black; the wings hyaline; the tegulæ yellow, the nervures pale testaceous.

Hab. Celebes.

3. *NOMIA FORMOSA*. *N. capite thoraceque nigris*; abdomine chalybeo; marginibus apicalibus segmentorum cæruleo fasciatis.

Female. Length $5\frac{1}{2}$ lines. Head and thorax black and very closely punctured; the face covered with griseous pubescence; the clypeus with a central longitudinal carina. Thorax: the apical margin of the prothorax, the margins of the scutellum, and the sides of the meta-

thorax covered with a dense short ochraceous pubescence; the disk of the thorax thinly sprinkled with short black hairs; the posterior tibiae obscurely ferruginous; the tarsi ferruginous; the legs covered with bright golden-yellow pubescence; wings subhyaline, the nervures ferruginous; the tegulae yellow with a fuscous stain in the middle. Abdomen obscurely chalybeous, closely punctured, the two basal segments strongly so; the apical margins of the segments with smooth shining narrow blue fasciae.

Male. Closely resembling the female, but with the legs black; the posterior femora incrassate, the tibiae narrow at their base and broadly dilated at their apex, which, as well as the calcaria, are pale testaceous. This species closely resembles a species from North China, *N. chalybeata*, Westw. MS., from which it is readily distinguished by the form of the fourth ventral segment, which is notched in the middle, rounded, and then emarginate with the lateral angles rounded; in the species from China the margin is arched, and fringed with fulvous pubescence.

4. *NOMIA HALIOTOIDES*. *N. nigra*, pube cinerea tecta, abdominis segmentis intermediis pube alba fasciatis.

Female. Length $4\frac{1}{2}$ lines. Black; head and thorax opaque, and thinly clothed with cinereous pubescence, that on the disk of the thorax and margin of the scutellum slightly ochraceous. The flagellum fulvous beneath, the mandibles ferruginous at their apex; the tarsi ferruginous, wings hyaline, nervures fuscous, stigma testaceous. Abdomen shining, delicately punctured; the basal margins of the second, third, and fourth segments with a band of cinereous pubescence, attenuated in the middle.

Hab. Celebes.

Fam. DASYGASTRÆ.

1. *MEGACHILE INCISA*. *M. nigra*, rude et dense punctata, facie fulvo pubescente; alis fuscis, segmentis abdominis marginibus multo depressis.

Male. Length $5\frac{1}{2}$ lines. Black; closely and strongly punctured, the punctures confluent on the abdomen. The face clothed with fulvous pubescence. The tarsi obscurely rufo-piceous, the claws ferruginous; wings dark fuscous, their base hyaline. Abdomen: the apical margins of the segments smooth, impunctate, their basal margins very deeply depressed; a deep fovea at the tip of the apical segment; the head, thorax, and abdomen clothed beneath with short cinereous pubescence.

Hab. Celebes.

2. *MEGACHILE FULVIFRONS*. *M. nigra*, delicatule punctata; facie dense fulvo pubescente; thoracis lateribus abdomineque subtus fulvo pubescentibus; fasciis marginalibus abdominis fulvis.

Female. Length 7 lines. Black; head and thorax closely punctured, the abdomen delicately so and shining; the mandibles stout, with two acute teeth at their apex, shining and covered with oblong punctures; the face, sides of the thorax, and abdomen beneath, densely clothed with fulvous pubescence; the apical margins of the segments of the abdomen above with narrow fasciæ of short fulvous pubescence; the abdomen in certain lights has a metallic tinge.

The male is similarly clothed to the female, the margins of the segments are deeply depressed, and that of the apical segment slightly notched in the middle.

Hab. Celebes.

3. **MEGACHILE TERMINALIS.** *M. nigra*, capite thoraceque dense punctatis; abdomine pube nigra vestito; segmentis duobus apicalibus pube alba vestitis; alis fuscis.

Female. Length 9 lines. Black; the face with tufts of black pubescence above the insertion of the antennæ; mandibles very stout, with an acute tooth at their apex, the inner margin subdentate, and covered with fine cinereous pubescence. Thorax with black pubescence at the sides of the metathorax; the wings dark fuscous. Abdomen clothed with black pubescence; the fifth and sixth segments clothed with ochraceous pubescence above, that on the sixth nearly white.

Hab. Celebes.

This species resembles the *M. ornata*; but when viewed beneath, the different colour of the pollen-brush at once separates them.

Gen. CERATINA, Spin.

1. *Ceratina viridis*, Guér. *Icon. Reg. Ann.* 444. t. 73. f. 6.

Hab. India (Bengal, N. India), Ceylon, Celebes, China.

2. *Ceratina hieroglyphica*, Smith, *Cat. Hym. Ins.* ii. 226.

Hab. Northern India, Celebes, Philippine Islands, Hong Kong.

Fam. DENUATÆ.

1. **STELIS ABDOMINALIS.** *S. dense punctata*, capite thoraceque nigris, abdomine ferrugineo; alis nigro-fuscis violaceo iridescentibus.

Male. Length 5 lines. Head and thorax black, abdomen ferruginous; head and thorax strongly punctured, the scutellum very strongly so; the sides of the face and the anterior margin of the face fringed with white pubescence. The posterior margin of the scutellum rounded; wings dark brown with a violet iridescence. Abdomen ferruginous and closely punctured.

Hab. Celebes.

2. **CÆLIOXYG FULVIFRONS.** *C. nigra*, rude punctata, facie pube fulva vestita; alis fuscis cupreo iridescentibus.

Male. Length 6 lines. Black; the head and thorax with large con-

fluent punctures; the face clothed with fulvous pubescence. Thorax : a stout tooth on each side of the scutellum at its base; wings dark brown with a coppery effulgence, subhyaline at their base; beneath clothed with short cinereous pubescence. Abdomen : elongate, conical; closely punctured, with the apical and basal margins of the segments smooth; the apical segment with a tooth on each side at its base and four at its apex; beneath the margins of the segments fringed with pale pubescence; the apical margin of the fourth segment notched in the middle; the fifth entirely clothed with pale pubescence.

Hab. Celebes.

Fam. SCOPULIPEDES.

Gen. ANTHOPHORA, *Latr.*

1. *Anthophora zonata*, *Linn. Syst. Nat.* i. 955. 19.

Hab. India, Ceylon, Malacca, Sumatra, Borneo, Philippine Islands, Hong Kong, Shanghai, Celebes.

Gen. XYLOCOPA, *Latr.*

1. *Xylocopa fenestrata*, *Fabr. Syst. Piez.* p. 339. 6. ♂.

Hab. India, Celebes.

2. *Xylocopa æstuans*, *Linn. Syst. Nat.* 961. 53.

Hab. India, Java, Singapore, Celebes.

3. *Xylocopa Dejeanii*, *St. Farg. Hym.* ii. 209. 59.

Hab. Java, Borneo, Sumatra, Celebes.

4. *Xylocopa collaris*, *St. Farg. Hym.* ii. 189. 26.

Hab. India, Sumatra, Malacca, Borneo, Celebes.

5. *XYLOCOPA NOBILIS*. *X. nigra*, pube nigra induta; abdominis basi pube flava, apice lateritio.

Female. Length 11 lines. Black; a narrow line of pale fulvous pubescence on the margin of the thorax in front, a patch of the same colour on each side of the metathorax, and the basal segment of the abdomen covered above with similar pubescence; the apical margin of the third and fourth segments, and the fifth and six entirely, covered with bright brick-red pubescence; the wings black, with coppery iridescence.

Hab. Celebes.

Fam. SOCIALES.

1. *APIS ZONATA*. *A. nigra*, thoracis lateribus dense ochraceo pubescentibus; alis fumatis; abdomine nitido, segmentis secundo tertio quartoque basi niveo pubescentibus.

Worker. Length 8-8½ lines. Black; the head and thorax opaque, the abdomen shining; the clypeus smooth and shining, the flagellum rufo-piceous beneath; the anterior margin of the labrum narrowly,

and the apex of the mandibles, ferruginous; the face with a little fine short cinereous pubescence above the insertion of the antennæ; the vertex with long black pubescence; the eyes covered with short black pubescence. Thorax: the sides with ochraceous pubescence; wings smoky, the superior pair darkest at their anterior margin beyond the stigma. Abdomen: a snow-white band at the basal margin of the second, third, and fourth segments, the bands continued beneath, but narrower.

Hab. Celebes, Philippine Islands.

Specimens of this species denuded of their white bands would approach the *A. unicolor* of Latreille; but that insect is described as having the anterior wings black; in the present species both pairs are of the same smoky colour, not approaching black.

Fam. MUTILLIDÆ.

Gen. MUTILLA.

1. *Mutilla sexmaculata*, *Swed. Nov. Act. Holm.* viii. 286. 44. ♀.

Mutilla fuscipennis, *Fabr. Syst. Pies.* 436. 35. ♂.

Hab. India (Punjaub, &c.), China, Java, Celebes.

2. *Mutilla unifasciata*, *Smith, Cat. Hym.* pt. iii. p. 38.

Hab. India, Celebes.

3. *Mutilla rufogastra*, *St. Farg. Hym.* iii. 629. 51. ♂.

Hab. India, Celebes.

4. *MUTILLA VOLATILIS*. *M. nigra*, rude punctata et pubescens; capite abdomineque nitidia, alis fusco-hyalinis.

Male. Length 5–6 lines. Black. Head and thorax very coarsely punctured; head and disk of the thorax punctured; the metathorax opaque, with a central abbreviated channel and covered with large shallow punctures; the eyes notched on their inner margin; wings fuscous and iridescent; the tegulæ smooth and shining. Abdomen shining and rather finely punctured; the basal segment narrow and campanulate; the margins of the segments thickly fringed with silvery-white hair; the cheeks, sides of the thorax, and beneath the legs and abdomen with scattered long silvery-white hairs.

Hab. Celebes.

Fam. SCOLIADÆ, *Leach.*

Gen. SCOLIA, *Fabr.*

1. *Scolia erratica*, *Smith, Cat. Hym. Ins.* pt. iii. p. 88. 10.

Scolia verticalis, *Burm. Abh. Nat.-Ges. Halle*, i. 37. 61.

Hab. India, Sumatra, Celebes.

2. *Scolia aurlenta*, *Smith, Cat. Hym. Ins.* pt. iii. p. 102. 80. (nec *Fabr.*

Hab. Philippine Islands, Celebes.

3. *Scolia fimbriata*, *Burm. Abh. Nat.-Ges. Halle*, i. p. 32. 24.

Hab. Java, Celebes.

4. *Scolia dimidiata*, *Guér. Voy. Coq. Zool.* ii. pt. 2. p. 248.

Hab. Senegal, Celebes.

5. *SCOLIA TERMINATA*. *S. nigra*, clypeo mandibulisque flavis, thorace flavo variegato, alis hyalinis, abdomine flavo quinque-fasciato, apicisque marginibus flavis.

Male. Length 5 lines. Black; the clypeus, labrum, and mandibles yellow; the former with a triangular black spot in the middle; the latter ferruginous at their apex. The posterior margin of the prothorax, the tegulæ, a transverse curved line on the scutellum, and a spot on the postscutellum yellow; the anterior and intermediate tarsi, tibiæ, and knees, and the posterior tibiæ outside, yellow; a black line on the intermediate tibiæ beneath, and the apical joints of the tarsi fuscous; wings hyaline, the nervures ferruginous. Abdomen brightly prismatic; the margins of all the segments with a narrow yellow fascia, those on the second and third segments terminating at the sides in a large rounded macula; the fascia very narrow or obliterated on the sixth segment; the fasciæ on the second and third segments continued beneath.

Hab. Celebes.

6. *SCOLIA AGILIS*. *S. nigra*, mandibulis clypeoque flavis, alis fulvo-hyalinis, abdomine prismatico flavo quadrifasciato.

Male. Length 8 lines. Black and punctured, with thin long griseous pubescence; the vertex, disk of the thorax, and the abdomen shining; the mandibles and clypeus yellow, the latter with a black bell-shaped spot in the middle; wings fulvo-hyaline, the nervures ferruginous; the tibiæ with a yellow line outside. Abdomen beautifully prismatic; the first and three following segments with a yellow fascia on their apical margins, the second and two following much attenuated in the middle, or the fourth interrupted.

Hab. Celebes.

7. *SCOLIA FULVIPENNIS*. *S. nigra*, antennis capiteque supra basin antennarum rubris, alis fulvo-hyalinis.

Male. Length 7 lines. Black; the antennæ and the head above their insertion ferruginous, the scape black, the head coarsely punctured. Thorax: coarsely punctured; the mesothorax with an abbreviated deeply impressed line in the middle of its anterior margin; wings fulvo-hyaline, the nervures ferruginous; the apex of the wings slightly fuscous, the anterior pair with two submarginal cells and one recurrent nervure. Abdomen: shining, punctured, and prismatic.

Hab. Celebes.

8. *SCOLIA ALECTO*. *S. nigra*, capite supra basin antennarum rubro; alis nigris violaceo micantibus.

Female. Length 14 lines. Black and shining; head red above the insertion of the antennæ, very smooth and glossy, with a few punctures at the sides of and in front of the ocelli; antennæ black; the mandibles with a fringe of ferruginous hairs on their inferior margin. Thorax: smooth on the disk, which has a few scattered punctures at the sides; the scutellum punctured and shining; the thorax in front and the metathorax with black pubescence, the latter widely emarginate at the verge of the truncation, the lateral angles produced; wings black with a bright violet iridescence. Abdomen punctured, with the middle of the second, third, and fourth segments smooth and shining in the middle; the first segment with a smooth shining carina at its base slightly produced forwards, the abdomen with a slight metallic lustre. The wings with one marginal and three submarginal cells, and one recurrent nervure.

Male. Smaller than the female, and differs in having the clypeus red and the red colour running down behind the eyes, the antennæ longer, and the abdomen with a bright metallic iridescence.

Hab. Celebes.

9. *SCOLIA MINUTA.* *S. nigra*, abdomine iridescente, segmentorum marginibus apicalibus flavo fasciatis, alis subhyalinis iridescentibus.

Male. Length 4 lines. Head and thorax black and shining, with scattered pale pubescence; the mandibles and clypeus yellow, the latter with an anchor-shaped black spot. Thorax: the posterior margin of the prothorax and the anterior and intermediate tibiæ and tarsi yellow; a minute yellow spot on the postscutellum yellow; the wings subhyaline, the nervures fusco-ferruginous. Abdomen: the apical margins of the segments with a narrow yellow border, the second and third uniting with a lateral spot; the sixth segment immaculate; the apex pale testaceous.

Hab. Celebes.

Fam. POMPILIDÆ, *Leach.*

1. *Pompilus analis*, *Fabr. Syst. Piez.* p. 209. 42.

Hab. India, Java, Ceylon, Celebes.

2. *POMPILUS SALTITANS.* *P. niger*, pedibus subferrugineis, prothoracis margine postica flava; alis flavo-hyalinis, apice fuscis, abdomine pilis cinereis fasciato.

Female. Length 6 lines. Black and thinly covered with ashy pile. The scape, labrum, mandibles and palpi ferruginous; the clypeus widely emarginate anteriorly. The posterior margin of the prothorax angular and with a yellow border; the scutellum prominent, covered on each side with a dense silvery-white pile, the postscutellum with two spots of the same; the wings flavo-hyaline, their apex with a broad dark-fusca border, the nervures ferruginous, the tegulæ yellow; the posterior wings palest; legs pale ferruginous, the coxæ black with

their tips pale; the apical joints of the tarsi blackish, the spines of the legs black. Abdomen: the first, second, and third segments with a fascia of silvery-white pile at their basal margins; the apex of the abdomen ferruginous.

Hab. Celebes.

3. *POMPILUS CONTORTUS*. *P. niger*; cinereo-pilosus, prothorace flavo postice marginato; alis subhyalinis, marginibus apicalibus fuscis, pedibus subferrugineis.

Female. Length $5\frac{1}{2}$ lines. Black; the head, thorax, and four basal segments of the abdomen covered with ashy pile; the first and second segments with their apical margins naked. The scape yellow in front; the flagellum beneath, the labrum, mandibles and palpi ferruginous; the joints of the antennæ arcuate, particularly the apical ones; the apex of each joint is oblique, giving the antennæ a twisted appearance. Thorax: the posterior margin of the prothorax angular and with a broad yellow border; the scutellum compressed and prominent; wings subhyaline with a broad fuscous border at their apex, the tegulæ yellow; legs pale ferruginous, with their coxæ and trochanters black; the apical joints of the tarsi fuscous. Abdomen with a yellow macula at the tip.

Hab. Celebes.

4. *POMPILUS PILIFRONS*. *P. niger*, facie argenteis pilis dense tecta; thorace abdomineque flavo maculatis, alis subhyalinis, apice fuscis.

Female. Length $4\frac{1}{2}$ lines. Black; the face densely covered with silvery-white pile; a narrow line at the inner orbits of the eyes, the palpi and mandibles yellow; the latter ferruginous at their apex. The posterior margin of the prothorax rounded and yellow; a minute yellow spot on the mesothorax touching the scutellum, the thorax and abdomen covered with a changeable silky pile; the wings subhyaline, their nervures fuscous, a broad dark fuscous border at the apex of the superior pair. A transverse spot on each side of the basal margin of the second and third segments, and an emarginate fascia on that of the fifth, yellow.

5. *POMPILUS DECEPTOR*. *P. rufescens*-flavus; vertice nigro, alis antice apice fuscis.

Male. Length 6 lines. Pale reddish-yellow; the antennæ slightly dusky above; a black transverse stripe on the vertex between the eyes, and another issuing from it in the middle and passing beyond the ocelli. Thorax: a black stripe on each side of the mesothorax over the tegulæ; the wings subhyaline, the nervures ferruginous, the superior pair fuscous at their apex. Abdomen immaculate.

Subgenus *PRIOCNEMIS*.

PRIOCNEMIS RUFIFRONS. *P. niger*; facie, antennis, tibiis tarsisque

ferrugineis, alis fulvo-hyalinis; abdominis segmento apicali flavo unimaculato.

Female. Length $9\frac{1}{2}$ lines. Black; the face above the clypeus, as high as the anterior ocellus, reddish-yellow; the extreme edge of the clypeus, the labrum and base of the mandibles ferruginous; the antennæ reddish-yellow. Thorax: fulvo-hyaline, with a dark fuscous border at the apex; the knees, tibiæ and tarsi reddish-yellow; the two latter spinose. Abdomen: gradually tapering to an acute point at the apex, the sixth segment with an elongate red spot.

Hab. Celebes.

Subgenus AGENIA.

1. *Agenia blanda*, Guér. *Voy. Coq. Zool.* ii. pt. 2. p. 260.

2. *AGENIA BIMACULATA*. *A. nigra*, cinereo-pilosa, clypeo plagiis duabus flavis; antennarum articulis apicalibus, tibiis tarsisque anticis et intermediis femoribusque posticis ferrugineis; alis subhyalinis, nervuris nigris.

Female. Length 7 lines. Black, and covered with ashy pile; a large macula on each side of the clypeus, the mandibles and palpi yellow; the base and apex of the mandibles rufo-piceous; the flagellum pale ferruginous, more or less fuscous above towards the base. Thorax: the posterior margin of the prothorax arched; the anterior and intermediate tibiæ and tarsi and the femora at their apex beneath, also the posterior femora, pale ferruginous; the wings subhyaline, the nervures dark fuscous. Abdomen: the apical margins of the segments obscurely and narrowly rufo-piceous, the apex ferruginous.

Hab. Celebes.

Gen. MACROMERIS, St. Farg.

1. *Macromeris splendida*, St. Farg. *Hym.* iii. 463. 1. ♂.

Hab. India, China, Malacca, Borneo, Java, Celebes.

Gen. MYGNIMIA, Smith.

1. *Mygnimia iridipennis*, Smith, *Journ. Proc. Linn. Soc.* ii. p. 98.

Hab. Celebes, Borneo.

This insect, a female, is 5 lines larger than *M. iridipennis*; but I can point out no other distinction beyond a slight difference in the colour of the wings: the specimen from Borneo has a metallic bluish-green iridescence, the Celebes insect has a violet iridescence; notwithstanding which I am inclined to regard them as one species.

2. *MYGNIMIA FUMIPENNIS*. *M. aurantiaco-rubra*, alis obscure fuscis

Female. Length 9 lines. Orange-red; the anterior margin of the clypeus entire; the labrum produced, its anterior margin widely emarginate; eyes large, black and ovate. Thorax: the posterior ma

of the prothorax rounded; the mesothorax with a longitudinal fuscous stripe on each side, widest anteriorly; the metathorax truncate; above, transversely striate; the tibiae and tarsi spinose; wings dark fuscous, with a pale semitransparent macula at the base of the second discoidal cell and a dark fuscous macula beyond; the insect entirely covered with a fine orange-red downy pile.

Hab. Celebes.

Fam. SPHEGIDÆ.

1. *SPHEX PRÆDATOR*. *S. niger*, rude punctatus, facie pube fulva vestita; alis fuscis cupreo iridescentibus.

Male. Length $10\frac{1}{2}$ lines. Black; the head and thorax opaque. Abdomen shining blue-black. The face with silvery pile on each side of the clypeus, and sprinkled with erect black hairs. Thorax: the posterior margin of the prothorax with a line of silvery pubescence; the metathorax with a short light-brown pubescence at the apex, and thinly clothed with black hairs; wings dark brown, with a brilliant violet iridescence. Abdomen blue-black, smooth and shining.

Hab. Celebes.

2. *AMMOPHILA INSOLATA*. *A. nigra*, scapo mandibulis, pedibus, abdominisque segmentis primo et secundo ferrugineis; alis subhyalinis.

Female. Length $8\frac{1}{2}$ lines. Black; the scape, the base of the flagellum beneath, the anterior margin of the clypeus and the mandibles ferruginous; the latter black at their apex. Thorax: the prothorax smooth and shining; the meso- and metathorax above transversely striated, the scutellum longitudinally so; the legs ferruginous, with their coxæ black; a spot of silvery-white pubescence on each side of the metathorax at its base, and two at its apex close to the insertion of the petiole; the wings fulvo-hyaline with the nervures ferruginous. Abdomen: the petiole and the following segment red, the base of the third also slightly red; the three apical segments obscurely blue, with a thin glittering pile.

The *male* differs in having the legs black, their articulations only being ferruginous; the head entirely black with the face densely covered with silvery-white pile. The thorax is sculptured as in the other sex; the petiole more elongate and slender, the basal joint black, the second and the first segment ferruginous beneath; the rest of the abdomen blue.

Hab. Celebes.

Gen. PELOPÆUS, Latr.

1. *Pelopæus Madraspatanus*, *Fabr. Syst. Pies.* p. 203. 3.

Hab. Malabar, Madras, Nepaul, Bengal, Celebes.

2. *Pelopæus Bengalensis*, *Dahlb. Syst. Nat.* i. 941. 2.

Hab. India, Philippine Islands, China, Isle of France, Celebes.

3. *PELOPÆUS INTRUDENS*. *P. niger*; clypeo bidentato, tibiis anticis et intermediis, femorumque apice, femoribusque posticis basi, trochanteribus, tibiis dimidio basali, petioloque rufescenti-flavis; alis fulvo-hyalinis.

Female. Length 11 lines. Black; the face with silvery pubescence; the clypeus with two large blunt teeth at its apex, formed by a deep notch in its anterior margin; the scape reddish-yellow in front. The meso- and metathorax transversely striated; the wings fulvo-hyaline, the nervures ferruginous; the anterior and intermediate tibiæ and the femora at their apex, the posterior femora at their base, the trochanters, the tibiæ with their basal half and the middle of the basal joint of the posterior tarsi, reddish-yellow; the petiole of the abdomen of a paler yellow; the abdomen smooth and shining. The male only differs in being rather smaller.

Hab. Celebes.

Mr. Wallace says of this species, "A common house-wasp in Macassar; builds mud cells on rafters."

Note.—In describing the species of this genus collected by Mr. Wallace at Borneo, I incorrectly gave that locality for *P. javanus*. The insect mistaken for that species may be shortly characterized as *P. benignus*, length 12 lines. Opaque-black, with the petiole shining; the metathorax transversely striated; the wings pale fulvo-hyaline, the nervures ferruginous; the scape in front, the anterior and intermediate tibiæ, the apex of the femora, and the basal joint of the tarsi reddish-yellow; the posterior legs, with the trochanters and basal half of the femora, yellow.

4. *PELOPÆUS FLAVO-FASCIATUS*. *P. niger*; capite thoraceque flavo variegato; pedibus abdominisque basi ferrugineis; alis hyalinis, apice fuscis, abdominisque segmento tertio fascia lata flava ornato.

Female. Length 9 lines. Black; the clypeus yellow; the mandibles and scape ferruginous, the former black at their base, the latter yellow in front; the sides of the face with a bright golden pile. Thorax: the posterior margin of the prothorax, the tegulæ, scutellum, and a quadrate spot on each side of the metathorax at its base yellow; the legs ferruginous, with the coxæ, trochanters, and claw-joint of the tarsi black; wings fulvo-hyaline, the nervures ferruginous, a fuscous spot at the apex of the anterior pair; the meso- and metathorax transversely striated, the latter with a yellow spot at the insertion of the petiole. Abdomen: the petiole slightly curved upwards, the first segment ferruginous; a broad yellow fascia at the apex of the third segment, the apex of the fourth with a narrow obscure fascia; the abdomen covered with a fine silky pile.

Hab. Celebes.

Fam. BEMBICIDÆ, *Westw.*

1. *Bembex trepanda*, *Dahlb. Hym. Europ.* i. p. 181.

Hab. India, Celebes.

Fam. LARRIDÆ.

Genus LARRA, *Fabr.*

1. *Larra prismatica*, *Smith, Journ. Proc. Linn. Soc.* ii. p. 103.
Hab. Malacca, Celebes.

Genus LARRADA, *Smith.*

1. *Larrada aurulenta*, *Smith, Cat. Hym. Ins.* pt. iv. 276. 6.
Sphex aurulenta, *Fabr. Mant.* i. 274. 10.
Hab. India, Java, Sumatra, Celebes, Philippine Islands, China, Cape of Good Hope, Gambia.

2. *Larrada exilipes*, *Smith, Cat. Hym. Ins.* pt. iv. p. 278.

3. LARRADA ÆDILIS. *L. nigra*; facie argenteo-pilosa, alis subhyalinis, articulis apicalibus tarsorum rufo-testaceis, abdomine lævi et nitido.

Female. Length $5\frac{1}{2}$ lines. Black; head and thorax subopaque, the abdomen shining; the face densely covered with silvery pile, the cheeks, sides of the thorax and abdomen thinly so; the tips of the mandibles and apical joints of the tarsi ferruginous, the latter obscurely so. The metathorax transversely and rather finely rugose, the truncation more strongly striated; the scutellum shining; the wings subhyaline, the nervures ferruginous; the tibiæ with scattered spines, the tarsi spinose.

4. LARRADA AURIFRONS. *L. nigra*; facie mesothoracis metathoracisque lateribus aurato pubescentibus, abdominis marginibus segmentorum trium basaliurn argentato piloso fasciatis; alis fuscis.

Male. Length 8 lines. Black; the face and outer orbits of the eyes clothed with golden pile; the lateral margins of the mesothorax and the metathorax thinly clothed with golden pile; wings dark fuscous with a violet iridescence; the three basal segments of the abdomen with fasciæ of silvery pile.

Hab. Celebes.

5. LARRADA PERSONATA. *L. capite thoraceque nigra, abdomine ferrugineo.*

Female. Length $8\frac{1}{2}$ lines. Head, thorax, and legs black; the two former closely punctured and thinly covered with short cinereous pubescence; the metathorax with the punctures running into transverse striæ in the middle; the sides of the thorax and the legs with a fine silky silvery-white pile; the tibiæ and tarsi strongly spinose; wings fusco-hyaline; abdomen entirely red, smooth and shining.

The *male* is smaller, and has the four apical segments of the abdomen black, the face, cheeks, and apical margins of the segments of the abdomen with silvery pile.

Hab. Celebes.

This is probably merely a variety of *L. simillima*, wanting the black apex to the abdomen; it very much resembles the *L. anathema* of Europe.

6. *LARRADA RUFIPES*. *L. nigra*, mandibulis pedibusque rufis; alia hyalinis, venis pallide testaceis; abdomine sericeo-piloso.

Female. Length 7 lines. Black; the head smooth and shining; the clypeus, the cheeks, and face anteriorly, covered with silvery pile; the scape in front, the mandibles, and palpi ferruginous. Thorax: the sides and beneath with a thin silvery-white pile; the legs ferruginous with the coxæ black, the posterior pair red beneath; the thorax closely punctured, the metathorax transversely striated; wings fulvo-hyaline, the nervures pale-testaceous. Abdomen shining, very closely and delicately punctured; thinly covered with a fine white silky pile, which is very bright on the margins of the segments, which are slightly rufo-piceous.

The *male* closely resembles the female, and is similarly sculptured and coloured.

Hab. Celebes.

7. *LARRADA FESTINANS*. *L. nigra*; facie abdominisque marginibus segmentorum argentato-pilosis.

Female. Length 3 lines. Black; the face and cheeks thinly covered with silvery pile. Thorax: the disk very closely punctured, the metathorax rugose; the sides and the legs with a fine glittering sericeous pile, the wings subhyaline, their apical margins fuscous, the nervures fuscous. Abdomen smooth and shining, covered with a thin silky pile, the apical margins with bright silvery fasciæ, only observable in certain lights.

The *male* closely resembles the female, but has the face more silvery.

Hab. Celebes.

Genus MORPHOTA, *Smith*.

1. *MORPHOTA FORMOSA*. *M. capite thoraceque nigris*; abdomine rufo, apice nigro, pilis argentatis ornato.

Female. Length 5 lines. Black, with the two basal segments of the abdomen red; covered with a brilliant changeable silvery pile, most dense on the face, cheeks, sides of the metathorax, and on the apical margins of the abdominal segments. The mandibles ferruginous, with their apex piceous. The vertex smooth, and having *three distinct ocelli*; the head more produced behind the eyes than in *Larrada*. Thorax: the prothorax subtuberculate at the sides; wings subhyaline and iridescent, the nervures fuscous, the tegulæ pale testaceous behind. The apical margin of the first segment of the abdomen rufo-fuscous.

Hab. Celebes.

The insects belonging to the genus *Morphota* differ from those *Larrada* in having three distinct ocelli, the vertex without any dep

sions, and the head much less compressed than in *Larrada*; the recurrent nervures are received nearer to the base and apex of the second submarginal cell; the species have, in fact, a distinct habit, and do not assimilate with the species of *Larrada*.

Genus TACHYTES, *Panz.*

1. *TACHYTES MOROSUS*. *T. niger*, scutello abdomineque nitidis, facie argenteo-pilosa; marginibus lateralibus abdominis segmentorum argentatis.

Female. Length $4\frac{1}{2}$ lines. Black; the face covered with silvery pile; the thorax finely and very closely punctured; the metathorax opaque and finely rugose, thinly covered with cinereous pubescence; the anterior tarsi ciliated on the exterior, and the intermediate and posterior tibiae with a few dispersed spines; wings fusco-hyaline and iridescent, the nervures fusco-ferruginous, the costal nervure black. Abdomen smooth and shining; the apical margins of the intermediate segments slightly depressed, with the sides sericeous.

Fam. CRABRONIDÆ.

Genus OXYBELUS, *Latr.*

1. *Oxybelus agilis*, *Smith*, *Cat. Hym. Ins.* pt. iv. 387. 25.
Hab. India, Celebes.

Genus CRABRO, *Latr.*

1. *CRABRO (RHOPALUM) AGILIS*. *C. obscuro-nigra*, clypeo argentato, capite, thorace abdomineque flavo variis.

Female. Length 4 lines. Black, opaque; head larger than the thorax, quadrate; the ocelli in a curve on the vertex; the clypeus and lower portion of the cheeks with silvery pile; the scape, two basal joints of the flagellum, the palpi, and the mandibles, yellow; the latter rufo-piceous at their apex. The margin of the prothorax, the tubercles, the scutellum, the tibiae and tarsi, the anterior femora and the intermediate pair at their apex yellow; the anterior femora black above; the wings subhyaline and iridescent, the nervures testaceous. Abdomen: with an elongate clavate petiole; the first segment with an oblique yellow macula on each side, the third with a large lateral macula at its base, and the following segments entirely yellow.

Hab. Celebes.

This species closely resembles the *C. Westermanni* of Dahlbome, from the Cape of Good Hope.

Genus CERCEBIS, *Latr.*

1. *Cerceris instabilis*, *Smith*, *Cat. Hym. Ins.* pt. iv. 452. 74.
Hab. India, China, Celebes.

2. *Cerceria unifasciata*, *Smith, Cat. Hym. Ins.* pt. iv. 456. 84.

Hab. North China, Celebes.

3. *Cerceria fuliginosa*, *Smith, Cat. Hym. Ins.* pt. iv. 454. 79.

Hab. Cêlebes.

4. *CERCERIS VARIPES*. *C. nigra*, facie flavo varia; alis fuscis basi hyalinis; pedibus variegatis; abdomine flavo maculato.

Male. Length 6 lines. Black; a line down the inner orbits of the eyes, continued along the lower margins of the face, and uniting with the clypeus, which as well as a line above it between the antennæ are yellow; a spot on the scape in front, and the mandibles, yellow; the latter rufo-piceous at their apex. Thorax: a spot on each side of the prothorax, a minute one on the tegulæ; the postscutellum, the intermediate and posterior coxæ and trochanters, the anterior tibiæ behind, the femora beneath, and the intermediate and posterior tibiæ yellow; the femora reddish above and at their articulations; the posterior femora and tibiæ black, with the tarsi rufo-testaceous; the anterior wings and the apex of the posterior pair brown, the base of the anterior pair hyaline. Abdomen: the second and three following segments with a short yellow stripe on each side.

Hab. Celebes.

Tribe VESPIDÆ.

Fam. EUMENIDÆ, *Westw.*

Genus ZETHUS, *Fabr.*

1. *Zethus cyanopterus*, *Sauss. Mon. Guêpes Sol.* i. 23. 2.

Genus MONTEZUMIA, *Sauss.*

1. *Montezumia Indica*, *Sauss. Mon. Guêpes Sol.* i. *supp.* 167. 59. t. 9. f. 4.

Hab. India, Celebes.

Genus RHYNCHIUM, *Spin.*

1. *Rhynchium hæmorrhoidale*, *Sauss. Mon. Guêpes Sol.* i. 109. 12.

Vespa hæmorrhoidalis, *Fabr. Syst. Piez.* p. 259. 28.

Hab. India, Java, Cape of Good Hope, Celebes.

2. *Rhynchium argentatum*, *Sauss. Mon. Guêpes Sol.* i. 115. 22.

Vespa argentata, *Fabr. Syst. Piez.* p. 260. 39.

Hab. India, Celebes.

3. *Rhynchium atrum*, *Sauss. Mon. Guêpes Sol.* i. 109. 11.

Hab. India, Celebes.

4. *Rhynchium parentissimum*, *Sauss. Mon. Guêpes Sol.* p. 111. 14.—

Var. *R. hæmorrhoidale*?

Hab. India, Java, Celebes.

Genus EUMENES.

1. *Eumenes circinalis*, *Fabr. Syst. Piez.* p. 286. 4.

Hab. India, Sumatra, Celebes.

2. *Eumenes fulvipennis*, *Smith, Cat. Hym. Ins.* pt. v. 24. 26.

Hab. Celebes.

3. *EUMENES VINDEX.* *E. niger*, *flavo variegatus*, *alis subhyalinis iridescentibus.*

Male. Length 6 lines. Black; strongly punctured and shining; a minute spot behind the eyes, another in their emargination, the clypeus, with two minute spots above it, a spot at the base of the mandibles, and the scape in front yellow. Thorax: a subinterrupted line on its anterior margin, the tubercles, a spot on the tegulæ behind, and the legs yellow; the coxæ, femora at their base, and the posterior tibiæ outside dusky; wings light brown and iridescent, the anterior margin of the superior pair darkest. Abdomen delicately punctured; the apical margin of the first segment with a narrow yellow border slightly interrupted on each side; the apical segments with a thin cinereous pile.

Hab. Celebes.

4. *EUMENES ARCHITECTUS.* *E. niger*, clypeo, prothoracis margine postscutello abdominisque segmenti primi margine flavis.

Female. Length 6 lines. Black and closely punctured; a line behind the eyes near their vertex, a spot between the antennæ and the clypeus, yellow; the latter black at the apex, which is notched; the labrum and mandibles reddish-yellow, the latter black at their base. Thorax: the anterior margin yellow; the tubercles, tegulæ, postscutellum, an interrupted line on each side of the metathorax, the tibiæ, tarsi, and femora at their apex, yellow; the coxæ spotted with yellow and the posterior tibiæ dusky; the wings fusco-hyaline; a black line across the tegulæ. Abdomen: an ovate spot on each side of the petiole, its apical margin, a transverse ovate spot on each side of the first segment, and its posterior margin yellow; the following segments covered with a grey silky pile.

Male. Differs from the female in having the clypeus entirely yellow, the metathorax and abdomen entirely black; only the apical margin of the petiole is yellow, it is also longer.

Hab. Celebes.

5. *EUMENES FLORALIS.* *E. niger*; clypeo flavo; thorace pedibusque ferrugineo-flavo variegatis.

Male. Length 6½ lines. Black; strongly punctured and shining; the clypeus and a spot above yellow; a narrow abbreviated line behind the eyes, a minute spot in their emargination, and the tips of the mandibles orange-red; the flagellum fulvous beneath. Thorax: the anterior and posterior margin of the prothorax, the tubercles, and a

spot on the tegulæ behind, a line on the postscutellum and the legs, orange-red, the coxæ black, and the tarsi dusky; the wings slightly brownish with a violet iridescence. Abdomen immaculate, with a minute spot on the posterior border of the petiole; the third and following segments with a fine cinereous pile.

Hab. Celebes.

Genus ODYNERUS, Latr.

1. *Odynerus ovalis*, Sauss. *Mon. Guêpes Sol.* 215. 122. t. 19. f. 4.

Hab. India, China, Celebes.

2. *ODYNERUS (ANCISTROCERUS) CLAVICORNIS.* *O. niger, flavo varius*; capite thoraceque fortiter, abdomine delicatule punctatis, antennis clavatis.

Male. Length $4\frac{1}{2}$ lines. Black; head and thorax strongly punctured and shining; a spot on the mandibles, the labrum, the clypeus, a spot above, the scape in front, a line in the emargination of the eyes and a spot behind them, yellow; the flagellum broadly clavate, the joints transverse, the apex of the club and the terminal hook reddish-yellow, the thickened part of the club concave beneath, the hook bent into the cavity. Thorax: two spots on the anterior margin, a spot on the tegulæ in front, and the legs, reddish-yellow, the coxæ dusky; the metathorax coarsely rugose and deeply concave-truncate. Abdomen: the first segment with a transverse carina at its base, in front of which is an irregularly cut deep transverse channel forming a second carina in front of the groove; the segments finely punctured, the first and second segments with a yellow posterior border, the fourth and following segments rufo-piceous.

Hab. Celebes.

3. *ODYNERUS (LEIONOTUS) INSULARIS.* *O. niger, flavo et aurantio variegatus*; abdominis basi ferruginea.

Male. Length 6 lines. Black; the head and thorax strongly punctured; the mandibles, clypeus, a line above extending to the anterior ocellus, the emargination of the eyes, a spot at their vertex and a line at their outer orbits, yellow; the antennæ reddish-yellow, with the scape pale yellow in front and a narrow fuscous line above; the yellow marking more or less stained orange. Thorax: the prothorax orange, its anterior border, the tubercles, tegulæ, two spots on the scutellum and postscutellum, the lateral margins of the metathorax and the legs, yellow, the latter with reddish stains; wings subhyaline, the superior pair with a fuscous cloud at their apex. The base of abdomen and a large macula on each side of the second segment ferruginous; the apical margin of the segments with a yellow border, the first and second with a minute notch in the middle; the first and second segments entirely ferruginous beneath.

4. *ODYNERUS FULVIPENNIS*. *O. niger, flavo varius, pedibus ferrugineis, alis fulvo-hyalinis.*

Male. Black; head and thorax closely and strongly punctured; the clypeus and two spots above, a line along the lower margin of the sinus of the eyes, a narrow line behind them, the scape in front, and the mandibles yellow; the tips of the latter rufo-piceous; the antennæ and legs ferruginous; an interrupted yellow line on the anterior margin of the thorax; the wings fulvo-hyaline; the veins which enclose the marginal and second and third submarginal cells fuscous, the rest pale testaceous; a fuscous cloud in the marginal cell. Abdomen: the apical margin of the second segment with a yellow fascia, the following segments with red fasciæ.

Hab. Celebes.

Genus *ICARIA*, *Sauss.*

1. *Icaria ferruginea*, *Sauss. Mon. Guêpes Soc.* p. 37. 15.

Hab. India, Celebes.

2. *ICARIA PILOSA*. *I. nigra, rude punctata et densissime pubescens, clypeo flavo, thorace, pedibus abdomineque ferrugineo variegatis; alis subhyalinis, anticis apice fusco maculatis.*

Male. Length $7\frac{1}{2}$ lines. Black; closely and strongly punctured; the clypeus, a line on the mandibles, and the scape in front, yellow; tips of the mandibles, the scape above, and the base of the flagellum ferruginous. Thorax: the prothorax, scutellum and postscutellum, ferruginous; the tegulæ and legs pale ferruginous, the coxæ black; wings fusco-hyaline, with a dark cloud in the marginal cell extending to the apex of the wing; a fainter cloud traverses the margin of the wing to its base. Abdomen: the first, second and third segments with a reddish-yellow fascia, that on the second segment continued beneath; a longitudinal broad stripe of the same colour on each side of the second segment; its apical margin serrated.

Hab. Celebes.

Genus *POLISTES*, *Latr.*

1. *Polistes sagittarius*, *Sauss. Mon. Guêpes Soc.* p. 56. 12.

Various specimens from Greece and Celebes have the thorax more or less ferruginous.

Hab. India, Celebes, China, Greece.

2. *Polistes Picteti*, *Sauss. Mon. Guêpes Soc.* 69. 28. t. 6. f. 8.

Hab. Ceram, Australia, Celebes.

3. *Polistes fastidiosus*, *Sauss. Mon. Guêpes Soc.* p. 60. 18.

Hab. Africa (Gambia), Celebes.

4. *Polistes stigma*, *Fabr. Syst. Piez.* p. 261. 41.

Hab. India, Ceram, Celebes.

5. *Polistes Philippinensis*, *Sauss. Mon. Guêpes Soc.* 58. 14 (var.).

Hab. Philippine Islands.

Genus *VESPA*, *Linn.*

1. *Vespa affinis*, *Fabr. Syst. Piez.* p. 254. 6 (var. *V. cincta*?).

Hab. India, China, Singapore, Celebes.

2. *VESPA FERVIDA*. *V. nigra*, delicatule punctata; clypei margine antica, macula pone oculos, margineque postica segmenti primi abdominis flavis; alis fulvo-hyalinis.

Female. Length 13 lines. Black; closely and finely punctured; the clypeus convex and strongly punctured, emarginate anteriorly, the emargination with a yellow border; the eyes extending to the base of the mandibles, which have three stout teeth at their apex and a narrow yellow line at their inner margin. Thorax: the postscutellum yellow, and a minute yellow spot on the outer margin of the tegulæ; the wings rufo-hyaline, darkest along the anterior margin of the superior pair; the nervures ferruginous, gradually becoming darker at the base of the wings, the costal nervure black.

Worker. Length 9 lines. Very closely resembles the female, but in addition to the yellow markings of that sex has the anterior margin of the clypeus yellow, a narrow transverse line between the antennæ, another along the lower margin of the notch of the eyes, an abbreviated stripe behind them at the base of the mandibles, a spot beneath the postscutellum and a narrow yellow line along the posterior margin of the basal segment of the abdomen.

Hab. Celebes.

Fam. TENTHREDINIDÆ.

Genus TENTHREDO, *Linn.*

1. *TENTHREDO* (ALLANTUS) *PURPURATA*. *T. capite thoraceque cæruleo-viridibus, abdomine purpureo, alis fuscis iridescentibus.*

Size, length 4 lines. Head and thorax blue-green, abdomen purple; wings dark fuscous with a violet iridescence; an oblique white line on each side beneath the scutellum; legs and antennæ black.

Hab. Celebes.

Fam. ICHNEUMONIDÆ.

Genus MEGISCHUS, *Brullé*.

1. *Megischus indicus*, *Westw. Trans. Ent. Soc.* new ser. i. 1851.

Hab. Philippine Islands, Celebes.

Genus MESOSTENUS, *Brullé*.

1. *MESOSTENUS ALBO-SPINOSUS*. *M. niger, albo varius, abdominis segmentis albo marginatis, metathorace spinis duabus albis armato.*

Female. Length $5\frac{1}{2}$ lines. Black; a half-circular spot on the clypeus, a heart-shaped one above it, a spot at the base of the mandibles, the orbits of the eyes, interrupted at their vertex, yellowish white, the palpi of the same colour, and a broad incomplete annulus on t/

antennæ beyond their middle. Thorax: the mesothorax with two deeply impressed oblique lines inclined inwards and terminating at an ovate spot in the middle of the disk, the scutellum and an oblique line on each side a little before it, a horseshoe-shaped spot in the middle of the metathorax, and a little below it on each side a conical tooth, yellowish white; four spots beneath the wings, one on each side of the metathorax, and the coxæ beneath, white; the legs ferruginous, with the intermediate pair dusky behind, the posterior pair entirely so, the femora being black; the wings hyaline, nervures fuscous. Abdomen: punctured and with a white fascia on the margins of the three basal segments; the two apical segments with very narrow fasciæ.

Hab. Celebes.

This species is closely allied to the *M. literatus* of Brullé; but it differs too much, I think, to be identical with it.

2. *PIMPLA TRIMACULATA*. *P. flava*, oculis, macula circa ocellos, vittulis tribus mesothoracis setisque caudalibus nigris.

Female. Length 6 lines. Yellow; the antennæ fuscous above, also a fuscous cloud at the apex of the anterior wings, the wings hyaline with the nervures black; a spot on the scape within, and three longitudinal stripes on the mesothorax, black; the latter slightly punctured anteriorly; the metathorax smooth and shining, with three oblique carinæ on each side, and a small subovate enclosed space in the middle of the disk. Abdomen punctured, all the segments margined at their apex, and each with a deeply impressed line at their extreme lateral margins; the sixth segment with two minute black spots at its basal margin, the two apical segments smooth and shining; the ovipositor black.

Hab. Celebes.

This species is closely allied to the *P. trilineata* of Brullé.

Fam. BRACONIDÆ.

1. *BRACON INSINUATOR*. *B. capite*, thorace pedibusque ferrugineis; antennis, tibiis tarsisque posticis et abdomine nigris; alis nigro-fuscis, macula hyalina sub stigmate.

Female. Length $7\frac{1}{2}$ lines. Head and thorax smooth, shining, and ferruginous, the legs ferruginous, with the posterior tibiæ and tarsi black; the antennæ black, with the scape and following joint ferruginous; wings dark brown, with their extreme base pale testaceous; a hyaline stripe runs from the stigma across the first submarginal cell and passes a little below it. Abdomen black, smooth, and shining, with the lateral margins of the basal segment pale yellow-testaceous; this segment has on each side a longitudinal carina, and between them is a highly polished bell-shaped form; the second segment with deep oblique depressions at the sides, and deeply

longitudinally rugose-striate, leaving the apical margin smooth and shining; the second segment is similarly sculptured, and the third has a transverse groove at its base.

Hab. Celebes.

2. *BRACON INTRUDENS*. *B. rufescenti-flavus*, antennis setisque caudalibus nigris; alis nigro-fuscis, basi fasciæque angusta transversa flavis.

Female. Length 9 lines. Pale reddish-yellow; the eyes, flagellum, and ovipositor black; the scape and the following segment yellow; the head and thorax smooth and shining, both pubescent at the sides and beneath, the legs covered with a similar pale pubescence; the face with an upright horn between the antennæ, and a raised flattened plate in front of it. Abdomen: the basal segment with the lateral margins raised, and having on each side an elongate broad depression extending its entire length; the three following with an oblique depression on each side at the base of the segment; the third, fourth, and fifth segments distinctly margined at their apex; the ovipositor the length of the insect.

Hab. Celebes.

Genus *AGATHIS*, *Latr.*

1. *AGATHIS SCULPTURALIS*. *A. nigra*, prothorace, pedibus anticis mediisque ferrugineis; abdomine lævigato nitido.

Male. Length $5\frac{1}{2}$ lines. Black; the mouth, prothorax, anterior and intermediate legs, ferruginous; the face with two teeth or horns between or a little before the insertion of the antennæ, and another at the side of each, close to their insertion. Thorax: the mesothorax with two deeply impressed lines in front, running inwards, and uniting about the middle, and with two or three deep transverse channels before their junction; the lateral margins of the mesothorax deeply impressed; the metathorax ruggedly sculptured; the posterior coxæ and femora closely punctured; wings black with a hyaline spot in the first submarginal cell. Abdomen very smooth and shining, with a deeply impressed line on each side of the basal segment.

Hab. Celebes.

2. *AGATHIS MODESTA*. *A. rufescenti-flava*; antennis, vertice, tibiis posticis apice, tarsisque nigris; alis fusco maculatis.

Female. Length 4 lines. Reddish-yellow: the antennæ and vertex, black. The mesothorax with two deeply impressed longitudinal oblique lines, and two parallel ones between them; the metathorax reticulated; wings hyaline, with a dark fuscous stain crossing the anterior pair at the base of the first submarginal cell, these hyaline to the middle of the stigma, beyond which they are fuscous; a subhyaline spot at the apex of the marginal cell, and another beneath it at the inferior margin of the wing; the posterior tarsi dusky, and the tips of the tibiæ black.

Hab. Celebes.

3. *AGATHIS NITIDA*. *A. nigra*, nitida; facie, pectore, pedibus anticis et intermediis, plaga infra alas, scutelloque pallide ferrugineis.

Length 4 lines. Black and shining; the face, mandibles, head beneath, legs, pectus, sides of the thorax beneath the wings, the scutellum and the basal half of the abdomen beneath, pale ferruginous; the mesothorax with two longitudinal oblique lines on the disk, which have two parallel ones between them; the metathorax coarsely rugose; the wings dark brown, with the base of the stigma pale, and a hyaline spot beneath it. Abdomen very smooth and shining, with the apical margins of the segments narrowly rufo-piceous; the posterior legs incrassate and dark rufo-piceous.

Fam. CHRYSIDIDÆ.

Genus HEDYCHRUM, Latr.

1. *HEDYCHRUM FLAMMULATUM*. *H. viridi-purpureo lavatum*; capite thoraceque fortiter, abdomine delicatule, punctatis; alis fuscis basi hyalinis.

Length 3 lines. Bright green; the vertex, two oblique stripes on the prothorax, meeting in the centre of its anterior margin, a broad longitudinal stripe on the disk of the mesothorax, and the sides of the scutellum and postscutellum deep purple. Abdomen: the middle of the basal segment, the second and third segments at their base, broadly purple; the apical margin of the third tinged with purple; wings subfuscous, with their base hyaline. The head and thorax coarsely and closely punctured, the abdomen finely so; the tarsi with the claws unidentate.

Hab. Celebes.

Genus CHRYSIS, Linn.

1. *CHRYSIS PURPUREA*. *C. late purpurea*, capite, thorace abdominisque basi rugosis punctatis, segmentis abdominis secundo et tertio delicatule punctatis, apice quadridentato.

Length 3 lines. Bright purple; the head, thorax, and base of the abdomen strongly and coarsely punctured, the rest of the abdomen finely punctured; the disk of the thorax and apical margins of the segments of the abdomen reflecting bright tints of green; the wings subhyaline, the nervures dark fuscous; the apical margin of the third segment of the abdomen with four teeth, the two central ones approximating, separated by a deep notch, the lateral teeth more distant, separated from the others by a wide emargination.

Hab. Celebes.

2. *CHRYSIS INSULARIS*. *C. nigro-purpurea, violaceo et viridi lavata*; capite, thorace abdominisque basi rude punctatis.

Length 5 lines. Dark purple, with violet and green reflections; the face, legs, and thorax beneath, green; wings slightly fuscous, and

iridescent; the head and thorax closely and coarsely punctured; the base of the abdomen roughly punctured, the two following segments much more finely so; the apical segment armed with six teeth, the outer ones subacute.

Hab. Celebes.

3. *CHRYDIS SUMPTUOSA*. *C. fortiter punctata*, metallico-viridis auro lavata; thoracis disco, abdominis segmentis secundo et tertio basi purpureis; segmento apicali margine integro.

Length $3\frac{1}{4}$ lines. Golden-green; the thorax at the sides and posteriorly with bright coppery effulgence; an oblong purple spot on the disk of the thorax; the metathorax and its lateral teeth vivid green, the vertex and prothorax splashed with gold. Abdomen: the basal segment bright green, with a bright coppery or golden effulgence at the sides; the second segment purple at the base, coppery at the apex, and with a suffusion of green between these tints; the third segment is similarly coloured, with the apical margin entire; the insect closely and strongly punctured throughout.

Hab. Celebes.

Description of a new Genus of Crustacea, of the Family Pinnotheridæ; in which the fifth pair of legs are reduced to an almost imperceptible rudiment. By THOMAS BELL, Esq., Pres. L. S.

[Read June 3rd, 1858.]

Fam. PINNOTHERIDÆ, *Edwards*.

Genus AMORPHOPUS, *Bell*.

CHAR. GEN.:—Corpus subcylindricum. Testa semicircularis, margine posteriore recto.—*Antennæ externæ minimæ*, articulo basali orbitam subtus partim claudente.—*Antennularum fossulæ transversæ*, continuæ, et ab orbitis haud separatæ.—*Pedipalpi externi* articulo quarto ovato, palpo tri-articulato, ad angulum antico-interiorem articuli quarti inserto.—*Oris apertura* antice arcuata.—*Orbitæ* apertæ, margine inferiore carente, superiore integro.—*Oculi* transversim positi.—*Pedes antici* robusti, inæquales; *pedum paria secundum, tertium et quartum* longa, subcompressa; *par quintum* exiguum, simplicissimum, rudimentarium, in incisura articuli basalis paris quarti insertum.—*Abdomen* MARIS segmentis tertio cum quarto, et quinto cum sexto coalitis; FEMINÆ ?

Sp. unica. *Amorphopus cylindraceus*, mihi.

Description.—The body is nearly cylindrical, somewhat depressed, the carapace very much curved from the point to the back,

straight from side to side; the anterior and lateral margins forming nearly a semicircle, the posterior margin straight; the orbits are deeply cut in the anterior margin of the carapace, looking upwards; the inferior margin wanting; the oral aperture much arched anteriorly; the external footjaws with the third articulation somewhat rhomboid, the fourth irregularly oval, and the palpi three-jointed, inserted at its anterior and inner angle. Epistome extremely small, transversely linear; the external antennæ placed directly beneath the orbits, the basal joints partly filling them beneath. The antennules folded transversely in large open fossæ, which are scarcely at all separated from each other, and are open to the orbits, the eyes lying transversely; the peduncles short and thick; the sternum is semicircular, the segments separated by very deep grooves; the abdomen very long and narrow, the first and second joint transversely linear, the third and fourth united and forming a triangle truncated anteriorly at the articulation of the portion formed by the fifth and sixth joints united, and which with the seventh form a very narrow and linear piece extending forwards to the posterior margin of the oral aperture; the first pair of legs robust, unequal (the right being the larger in the only specimen at present observed); the hand in each as broad as it is long; that of the smaller conspicuously tuberculated, that of the larger much less so; the former with the fingers nearly meeting throughout their length, those of the latter only at the tips; the second, third, and fourth pairs of legs are long, somewhat compressed, the third joint tuberculated on the under side, the third pair the longest; the fifth pair is reduced to a mere rudiment, in the form of a minute tubercle inserted in a little notch at the base of the first joint of the fourth pair, and scarcely discernible by the naked eye.

Observations.—The relation of this genus to the Pinnotheridæ is tolerably obvious, in the smallness of the antennæ, the direction and arrangement of the eyes, and particularly in the form of the oral aperture, and of the external footjaws. I shall not, however, enter upon the consideration of these relations, as I am about shortly to offer to the Society a review and monograph of the whole of this family. The most remarkable peculiarity in the genus is the apparent absence of the fifth pair of legs, which can only be discovered to exist at all by examination with the help of lens. In this respect I doubt not that the Fabrician genus *Cerapus*, adopted and figured by De Haan, will be found to agree with it, although it is very remarkable that the anomalous condi-

tion of this part never excited any particular attention on the part of either of these distinguished naturalists; and De Haan describes Fabricius's species, *Hexapus serpes*, as if there were nothing especial or abnormal in a Decapod having only six pairs of legs besides the claws. Mr. White made a similar mistake on one occasion, when he described an anomourous genus allied to *Lithodes*, in which the fifth pair of legs were not visible; but when, at my suggestion, a more careful examination was made, they were found, as was anticipated, in a rudimentary form, concealed under the edge of the carapace. I believe that I can discover even in De Haan's figure something like a little tubercle at the base of the fourth leg, which is probably the rudimentary representative of the fifth.

Death of the Common Hive Bee, supposed to be occasioned by a parasitic Fungus. By the Rev. HENRY HIGGINS. Communicated by the President.

[Read June 3rd, 1858.]

On the 18th of March last, Timpron Martin, Esq., of Liverpool, communicated to me some circumstances respecting the death of a hive of bees in his possession, which induced me to request from him a full statement of particulars. Mr. Martin gave me the following account:—

“ In October last I had three hives of bees which I received into my house. Each doorway was closed, and the hive placed upon a piece of calico; the corners were brought over the top, leaving a loop by which the hive was suspended from the ceiling. The hives were taken down about the 14th of March; two were healthy, but all the bees in the third were dead. There was a gallon of bees. The two hives containing live bees were much smaller; but in each of them were dead ones. Under whatever circumstances you preserve bees through the winter, dead ones are found at the bottom, in the spring. The room, an attic, was dry; and I had preserved the same hives in the same way during the winter of 1856. In what I may call the dead hive there was abundance of honey when it was opened; and it is clear that its inmates did not die for want. It is not a frequent occurrence for bees so to die; but I have known another instance. In that case the hive was left out in the ordinary way, and possibly cold was the cause of death. I think it probable that my bees died about a month before the 14th of

March, merely from the circumstance that some one remarked about that time that there was no noise in the hive. They might have died earlier; but there were certainly live bees in the hive in January. I understand there was an appearance of mould on some of the combs. There was ample ventilation, I think; indeed, as the bees were suspended, they had more air than through the summer when placed on a stand."

When the occurrence was first made known to me, I suggested that the bees might probably have died from the growth of a fungus, and requested some of the dead bees might be sent for examination. They were transmitted to me in a very dry state; and a careful inspection with a lens afforded no indications of vegetable growth. I then broke up a specimen, and examined the portions under a compound microscope, using a Nachet No. 4. The head and thorax were clean; but on a portion of the sternum were innumerable very minute, linear, slightly curved bodies, showing the well-known oscillatory or swarming motion. Notwithstanding the agreement of these minute bodies with the characters of the genus of *Bacterium* of the Vibrionia, I regarded them as spermatia, having frequently seen others undistinguishable from them under circumstances inconsistent with the presence of *Conferveæ*, as in the interior of the immature peridia and sporangia of Fungals.

In the specimen first examined there were no other indications of the growth of any parasite; but from the interior of the abdomen of a second bee I obtained an abundance of well-defined globular bodies resembling the spores of a fungus, varying in size from $\cdot 00016$ to $\cdot 00012$ in. Three out of four specimens subsequently examined contained similar spores within the abdomen. No traces of a mycelium were visible; the plants had come to maturity, fruited, and withered away, leaving only the spores.

The chief question then remaining to be solved was as to the time when the spores were developed; whether before or after the death of the bees. In order, if possible, to determine this, I placed four of the dead bees in circumstances favourable for the germination of the spores, and in about ten days I submitted them again to examination. They were covered with mould, consisting chiefly of a species of *Mucor*, and one also of *Botrytis* or *Botryosporium*. These fungi were clearly extraneous, covering indifferently all parts of the insects, and spreading on the wood on which they were lying. On the abdomen of all the specimens, and on the clypeus of one of them, grew a fungus wholly unlike the sur-

rounding mould. It was white and very short, and apparently consisted entirely of spores arranged in a moniliform manner, like the fertile filaments of a stemless *Penicillium*. These spores resembled those found in the abdomen of the Bees, and proceeded I think, from them. The filaments were most numerous at the junction of the segments. The spores did not resemble the globules in *Sporendonema muscae* of the English Flora, neither were they apparently enclosed.

The Rev. M. J. Berkeley, to whom I sent some of the bees, procured, by scraping the interior of the abdomen with a lancet, very minute, curved linear bodies from $\frac{1}{8000}$ to $\frac{1}{10000}$ in. long, which he compares to Vibrios. He also found mixed with them globular bodies, but no visible stratum of mould.

From the peculiar position of the supposed spores within the abdomen of the bees, and from the subsequent growth of a fungus unlike any of our common forms of Mucedines, I think it probable that the death of the bees was occasioned by the presence of a parasitic fungus.

Notice of the occurrence of recent Worm Tracks in the Upper Part of the London Clay Formation near Highgate. By JOHN W. WETHERELL. Communicated by JAMES YATES, Esq., M.A., F.L.S.

[Read June 3rd, 1858.]

THE London clay is very tenacious, and near the surface is generally of a brown colour, probably owing to the decomposition of the iron pyrites which it contains. It abounds in selenite or sulphate of lime, and in nodules which often contain organic remains. Fossil wood with *Teredo antenautæ* is also met with, and pyritous casts of univalve and bivalve shells. Lower down the stratum becomes more compact and is of a bluish or blackish colour, and its fossil contents are in a fine state of preservation. During the last summer, while examining the London Clay in the vicinity of Highgate in search of fossils, my attention was directed to certain appearances in it which I could not account for. This led to a further examination, when I found they were produced by the borings of *Lumbrici* or earth-worms. The appearances consisted of long tubes passing nearly perpendicularly through the clay and terminating in receptacles or at each tube leading to a separate receptacle. As these receptacles

occurred in large numbers, I had an opportunity of examining a great many of them with various results. In one instance, I found a dead worm coiled up; in another, a portion of a worm protruding into the lower part of the tube. Again, *nidi* were found partially filled with only the casts of worms, whilst others contained more or less of a species of *Conferva*; and, lastly, I obtained some with the cavities partially or wholly filled up. The receptacles varied in shape, from a sphere to an oval, and were extremely thin and fragile. They also varied in size from a pea to a nut. Externally they presented an appearance so singularly contorted, that I could not help considering they were moulded from the casts of worms. They did not appear to have any attachment to the surrounding clay, except at the point of junction with the tube; and the clay beneath them presented no unusual appearance.

Internally they generally exhibited impressions of the worm; but occasionally I detected some of the round and contorted appearances which I have mentioned as being so conspicuous on the outside. I cannot speak with precision as to the length of the tubes, as the clay when examined had been broken up into large rough masses in digging for the foundations of houses. The largest noticed was about three inches long, and the general width one-eighth of an inch. They often run parallel to each other, but at unequal distances. I now have to notice what I consider a remarkable circumstance, namely, that all the tubes contained a solid cylinder of clay, and in every instance where the worms occurred under the circumstances above recorded, they were found to be dead. Researches of this kind are calculated to throw a light on some of those singular phenomena which geologists occasionally meet with in the older rocks.

[*Mem.*—Several specimens of clay, containing the worm-tubes as above described, were exhibited to the meeting.]

Natural History—Extracts from the Journal of Captain Denham, H.M. Surveying Vessel 'Herald,' 1857. Communicated by Captain WASHINGTON, through the Secretary.

[Read June 3rd, 1858.]

WE found upon the larger islands the small species of the Kangaroo, bearing the native name Wallaby (*Halmaturus Billar-*

dieri), which, when mixed with other meats, affords a fine-flavoured soup.

On the ialets are flocks of the Cape Banca goose, which Mr. Smith informed me were only to be found in these straits in the vicinity of Flinders Island, from Cape Banca to Cape Frankland (west about), and that they are readily domesticated, and hatch from three to seven eggs, and afford an acceptable dish. I obtained a live specimen, which Dr. Rayner of this ship describes thus:—" *Cereopsis Novæ Hollandiæ*. Body about the size of a common goose; bill short, vaulted, obtuse, two-thirds of which is covered by an expanded cere of a pale greenish-yellow colour, the tip of the bill being black, arcuated, and truncated. Nostrils large, round, open, and situated in the middle of the bill. Wings ample, third quill longest. Legs long, light dull-red, and naked to a little above the knee. Feet black, webbed, the membrane being deeply notched, great toe articulated to the metatarsus. Plumage slate-grey, with black spots upon the wings and back. Wing-feathers dusky black, and edged at the tip with pale grey. Irides light hazel."

We likewise obtained specimens of the following wildfowl:—

AVES.

A BRONZE-WING PIGEON,	<i>Phaps elegans</i> .
QUAIL,	<i>Corturnix pectoralis</i> (<i>Gould</i>).
OYSTER-CATCHER,	<i>Hematophus fuliginosus</i> .
RING PLOVER,	<i>Hiaticula bicincta</i> .
WILD DUCK,	<i>Anas punctata</i> (<i>Cuvier</i>).
GREAT GULL,	<i>Larus pacificus</i> .
LESSER GULL,	<i>Xema Jamesonii</i> .
MUTTON BIRD,	<i>Puffinus brevicaudus</i> (<i>Brandt</i>).
SOUTHERN GANNET,	<i>Sula australis</i> (<i>Gould</i>).
SMALL PENGUIN,	<i>Spheniscus minor</i> (<i>Temminck</i>).

The Mutton Bird we observed streaming from island to island; and I learnt from Mr. Benvenuto Smith the following particulars of its habits from his own observations.

The male birds come in from sea in the month of September, and prepare the burrows for the reception of the hens. The hen bird does not make her appearance till about the 25th November when she lays and sits at once.

The Mutton Bird lays but one egg; they are employed rearing the young bird until the month of May, at which time the old birds leave the young ones to shift for themselves; the young birds remain in the burrows till they are starved down, and then

set off to sea, and are not seen again amongst the islands till September. The cock and hen sit alternately night and day; and all the labour of providing for the young is equally shared.

There are at this date about ninety people living on the small islands in "Franklin Inlet" who make a livelihood by gathering the oil, feathers, and eggs of the Mutton Bird.

Upwards of 2000 gallons of the oil are extracted from the birds annually; and although 800,000 birds are known to be destroyed each year, they appear undiminished in numbers. The oil burns well, and is of a bright-red colour.

I was presented by Mr. Smith with two Paper Nautilus shells (*Argonauta tuberculosa*) found on the shore of Flinders Island this season, a circumstance which he has remarked occurs but every seventh year, when many hundreds are thrown up: the shells are rarely obtained perfect, as they are extremely fragile, and the sea fowl pick the fish out of them.

Our Botanic Collector, Mr. Milne, ascertained, from what he obtained himself and from what we could contribute from our individual visits to the islets, the existence of plants, which he believes to be indigenous, belonging to the following families and genera, viz.

Amentaceæ.	Umbelliferae.
Asteraceæ.	Graminaceæ.
Rosaceæ.	Juncææ.
Geraniaceæ.	Solanum.
Euphorbiaceæ.	Geranium.
Myrtaceæ.	

Testing the chances of fish refreshment at this anchorage, we found little encouragement for hook and line; but the two favouring opportunities which the weather allowed for hawling the seine produced as tabulated on opposite page.

We found the Reef Islands in this sound so abundant in rabbits since Captain Stokes's forethought had set some loose upon them, that, in two visits of four hours with but four guns, 100 brace were brought on board.

I took care to follow my esteemed brother officers' example and the system of introducing such productions, and obtained a dozen couple alive for letting loose in Shark Bay.

[A coloured drawing of *Cercopsis Novæ Hollandiæ* accompanied Captain Denham's observations.]

Locality.	How many hauls and phase of O.	Trawl-seine, or hook and line.		Natural History Names.	Common Names.	No. of sets.	Pounds weight.
		Depth of water.	Nature of bottom.				
West side	6 hauls	with seine.	...	Mugil	Mullet	23	28
Flinders Isl. ...	...	$\frac{1}{2}$	...	Hemiramphus	Gar-fish	10	5
Settlement ...	O	1 fathom	Sand	Platycephalus	Flat-head, small	3	1
Bay	14 days	on	and	Rais	Sting Ray	2	29
H.W.F. & C.D. X. 30.	...	a flat	weed	Iulis	Small fish of the Bass family...	Several	...
Range 10 ft. ...	L.W.	...	...	Labrax	Basse	1	1
East side of } Hummock ... }	7 hauls	with seine (mar.).	...	Myiobatis	Ray	11	875
Island centre...	26 days	1 to 3 fms.	Sandy beach	Mugil	Mullet	20	30
				Platycephalus	Flat-head	3	2
				Siphyracua	Barracouta	1	1
				Scomberesox	Saury	27	17
	at $\frac{1}{2}$ flood	...	...	Sepioteuthis	Cuttle-fish	Several	...
Bay				Total .....		...	489

On some points in the Anatomy of *Nautilus pompilius*. By T. H. HUXLEY, F.R.S., Professor of Natural History, Government School of Mines.

[Read June 8rd, 1858.]

SOME time ago my friend Dr. Sinclair, of New Zealand, had the kindness to offer me two specimens of the Pearly Nautilus which had been brought to him from New Caledonia, preserved in Goadby's solution. I gladly accepted the present, and looked forward to the dissection of the rare animal with no little pleasure; but on proceeding to examine one of the specimens, I found its anatomical value greatly diminished by the manner in which a deposit from the solution had glued together some of the internal viscera. Other parts of the Nautilus, however, were in a very good state of preservation; and I have noted down such novel and interesting peculiarities as they presented, in the hope that an account of them will be acceptable to the Linnean Society.

Of the six apertures which, besides the genital and anal outlets, open into the branchial cavity of *Nautilus pompilius*, one on each side lies immediately above and in front of that fold of the inner wall of the mantle which forms the lower root of the smaller and inner gill, and encloses the branchial vein of that gill. The aperture is elongated and narrow, with rather prominent lips. It measures about $\frac{1}{8}$ th of an inch.

The other two apertures are larger, and lie at a distance of $\frac{1}{8}$ ths of an inch below and behind the other. They are in close juxtaposition, being separated only by a thin triangular fold of membrane, which constitutes the inner lip of the one and the outer lip of the other.

The inner aperture is the larger, measuring $\frac{3}{8}$ ths of an inch in long diameter, and having the form of a triangle with its base directed posteriorly. The outer aperture is not more than $\frac{1}{4}$ th of an inch long. The two apertures lie just above the edge of the fold of membrane which runs from the inner root of the larger or outer branchia, across the branchial cavity and beneath the rectum, to the other side.

These apertures lead into five sacs, which collectively constitute what has been described as the pericardium. The sacs into which the superior apertures open, by a short wide canal with folded walls, are situated on each side of and above the rectum. Their inner boundaries are separated by a space of not less than $\frac{1}{2}$ ths of an

inch in width, in which lie the vena cava and the oviduct. Each cavity has a rounded circumference, and a transverse diameter of about half an inch. In a direction at right angles to this diameter the dimensions vary with its state of distension; but a quarter of an inch would be a fair average.

The anterior or outer wall of the cavity is formed by the mantle; the posterior, inner, or visceral wall by a delicate membrane. The former separates it from the branchial cavity; the latter from the fifth sac, to be described by-and-by. I could find no natural aperture in the thin inner wall, so that I conceive no communication can take place between either of these sacs and the fifth sac.

Two irregular, flattened, brownish, soft plates depend from the posterior wall of the sac into its cavity; their attached edges are fixed along a line which is directed from behind obliquely forwards and upwards.

The outer and smaller of the inferior apertures on each side leads into a sac of similar dimensions and constitution to the preceding, but having a less rounded outline in consequence of its being flattened in one direction against its fellow of the opposite side, from which it is separated only by a delicate membranous wall, whilst on another side it is applied against the inferior wall of the superior sac, and is in like manner separated from it only by a thin and membranous partition.

Like the upper sacs, each of these has two dark-brown, lamellar, glandular masses depending from its membranous visceral wall.

A delicate, but broad, triangular membranous process, about $\frac{1}{4}$ th of an inch long, hangs down freely from the visceral wall of the cavity just behind the opening of the short canal which connects the sac with its aperture.

The third and largest aperture on each side opens directly into a very large fifth cavity, whose boundary is formed anteriorly by the visceral walls of the sacs already described, and behind this by the mantle itself as far as the horny band which marks and connects the insertion of the shell-muscles.

In fact this cavity may be said to be co-extensive with the attached part of the mantle,—the viscera, enclosed within their delicate “peritoneal” membranous coat, projecting into and nearly filling it, but nevertheless leaving a clear space between themselves and the delicate posterior wall of the mantle.

A layer of the “peritoneal” membrane extends from the posterior edge of the muscular expansion which lies between the shell-muscles and from the upper wall of the dilatation of the vena cava,

and passes upwards and backwards like a diaphragm to the under surfaces of the gizzard and liver. It is traversed by the aorta, to whose coats it closely adheres.

Along a line nearly corresponding with the horny band which proceeds from the insertions of the shell-muscles and encircles the mantle below, the pallial wall is produced inwards and forwards into a membranous fold or ligament, which I will call the pallio-visceral ligament; and this pallio-visceral ligament becoming attached to various viscera, divides the great fifth chamber into an anterior inferior, and a posterior superior portion, which communicate freely with one another.

Commencing with its extreme right-hand end, the ligament is inserted into the line of reflection of the mantle, and then into the wall of the oviduct, which becomes enclosed as it were within the ligament. The latter then ends in a free edge on the inner side of the oviduct, and is continued along it until it reaches the inferior surface of the apex of the ovary, into which it is inserted.

The free edge is arcuated; and the rectum passes over it, but is in no way connected with it.

Here, therefore, is one great passage of communication between the anterior and posterior divisions of the fifth chamber.

On the left side, this aperture is limited by the heart, whose posterior edge is, on the left side, connected by means of a ligamentous band with the surface of the apex of the ovary; but on the right, for the greater part of its extent, receives a process of the pallio-visceral ligament. Between the ovario-cardiac ligament and this process lies the small oval aperture already described by Professor Owen, which gives passage to the siphonal artery. It constitutes the middle aperture of communication between the two divisions of the fifth chamber.

The left-hand end of the ligament is inserted into the upper wall of the dilated end of the vena cava; but between this point and the heart it has a free arcuated edge, as on the right side.

Thus there are in reality three apertures of communication between the two divisions of the fifth chamber, the middle, by far the smallest, being alone hitherto known.

A delicate membranous band passes from the whole length of the middle line of the rectum to the heart and to the ovary.

The singular "pyriform appendage" of the heart lies in the left process of the ligament, its anterior edge nearly following the arcuated contour of that process.

The siphuncular process of the mantle was broken in my speci-

men ; but its aperture appeared to communicate quite freely with the posterior division of the fifth chamber.

Four sets of brownish, glandular-looking bodies depend into the anterior division of the fifth chamber, from parts of the delicate septa dividing this from the four small sacs, corresponding with the insertions of the glandular bodies above described.

In fact, on distending the vena cava with air, it is found that the four branchial arteries traverse these septa, and that the appendages in question are diverticula of their walls. Consequently the anterior wall of each branchial vein is produced into two glandular appendages, which hang into one of the four smaller sacs, while the posterior wall is produced into a single mass of appendages, which hangs into the anterior division of the fifth chamber.

Although, as I believe, the five chambers do not communicate directly, all the appendages must nevertheless be equally bathed with sea-water, which enters by the apertures of the chambers.

An impacted yellowish-white concretionary matter filled the anterior chamber ; and a small quantity of it lay as a fine powder at the bottom of the posterior one. In the latter, however, its presence might, by possibility, have been accidental. My colleague, Dr. Percy, who kindly undertook to examine this substance, informs me that he has been unable to detect uric acid in it. The follicular appendages of the branchial arteries present remarkable differences in their external appearance. The eight which hang into the four anterior chambers are similar, slightly festooned, but otherwise simple lamellæ ; while the four which depend into the posterior chambers are produced into a number of papillary processes. This external difference is obvious enough : whether it be accompanied by a corresponding discrepancy in minute structure I am unable to say ; for I have not as yet been able to arrive at any satisfactory results from the microscopic examination of the altered tissues, and, as will be seen below, the only observer who has had the opportunity of examining the *Nautilus* in the fresh state has not noted any difference of structure in the two sets of follicles.

One is naturally led to seek among other mollusks for a structure analogous to the vast posterior aquiferous chamber of *Nautilus* ; and it appears to me that something quite similar offered by the *Ascidioda* and the *Brachiopoda*. In both the viscera, inclosed within a delicate tissue, project into a cavity communicating freely with the exterior by the cloacal :

ture in the one case, and by the funnel-shaped channels which have been miscalled "hearts" in the other.

The rudimentary renal organs of the Ascidian are developed in the walls of the cavity in question; and an aquiferous chamber of smaller dimensions has the same relation to the kidney in Lamellibranchiata—in Gasteropoda, Heteropoda, Pteropoda, and dibranchiate Cephalopoda. But although such is likely enough to be the case, we do not know at present that the aquiferous chambers in any of the last named mollusks attain an extension similar to that which obtains in Nautilus.

On comparing the observations detailed above with the statements of previous writers, I find that, in his well-known "Memoir on the Pearly Nautilus" (1832), Professor Owen describes "on each side, at the roots of the branchiæ," "a small mamillary eminence with a transverse slit which conducts from the branchial cavity into the pericardium. There is, moreover, a foramen at the lower part of the cavity (*o*, pl. 5) permitting the escape of a small vessel; and by the side of this vessel a free passage is continued between the gizzard and ovary into the membranous tube or siphon that traverses the divisions of the shell, thus establishing a communication between the interior of that tube and the exterior of the animal."

The foramen here described is easily seen; but, as I have stated, there are other modes of communication between the so-called pericardium and the cavity with which the siphuncle communicates, of a far more extensive nature.

With respect to the pericardium itself, Professor Owen states, "The peritoneum, after lining the cavity which contains the crop and liver, and enveloping those viscera, forms two distinct pouches at the bottom of the pallial sac, in one of which, the left, is contained the gizzard, and in the other the ovary; anterior to these, and on the ventral aspect of the liver, is another distinct cavity, of a square shape, which contains the heart and principal vessels, with the glandular appendages connected therewith." This is what the author terms the pericardium.

As Van der Hoeven has pointed out, however, the gizzard lies to the right and the ovary to the left. Moreover, the gizzard is superior to the ovary, so as only to overlap it a little above; and I can find no evidence of the existence of such distinct pouches as those described.

Professor Owen states that the branchiæ "arise by a common peduncle from the inner surface of the mantle." My own obser-

vations, however, and Van der Hoeven's figures, of both male and female, lead me to believe that the peduncles of the branchiæ are perfectly distinct from one another.

The follicles of the branchial arteries are thus described in the "Memoir on the Pearly Nautilus:"—"They are short and pyri-form and closely set together. To each of the branchial arteries are appended three clusters of these glands, of which one is larger than the united volume of both the others; and the larger cluster is situated on one side of the vessel and the two smaller on the opposite side. Each of these clusters is contained in a membranous receptacle proper to itself, partitioned off, as it were, from the pericardium, but communicating with it. . . . The two canals which form the communication between the pericardium and the branchial cavity commence at the receptacle of the lesser cluster attached to the superior branchial arteries, and terminate at the papillæ before mentioned, which are situated at the roots of the branchiæ. The pericardium and these receptacles of the glands, when first laid open, were found filled with a coagulated substance so closely compacted as to require a careful removal, bit by bit, before the contained follicles and vessels could be brought into view."

Like Valenciennes and Van der Hoeven, I have been unable to find any communication between the four sacs in which the small double clusters of follicles are contained, and the "pericardium;" and I hold it to be certain that the other four sets of follicles are not contained in sacs at all, but lie free in the "pericardium" or posterior chamber.

No notice is here taken of the widely different characters of the anterior and posterior follicles; and the figure gives both a similar structure.

Valenciennes ("Nouvelles Recherches sur le Nautille Flambé," 'Archives du Muséum,' ii., 1841) pointed out the existence of three pairs of apertures opening into the branchial sac, besides the genital and anal openings; and he affirms that they open into as many closed sacs, which communicate neither with one another nor with the cavity that contains the heart. M. Valenciennes indicates the difference in the structure of the anterior and posterior venous appendages. He seems to me to have seen something of the part which I have described as the pallio-visceral ligament; but I cannot clearly comprehend either his figure or his description.

Van der Hoeven, in his 'Contributions to the Knowledge of the Animal of *Nautilus pompilius*,' 1850, confirmed the statement

of Valenciennes with regard to the existence of three pairs of apertures; but he showed, in opposition to him, that one of these pairs of apertures communicated with the pericardium. The sacs into which the other two pairs open are, according to this anatomist, blind. In the aperture of the anterior blind sac he found a concretionary matter which he supposed to contain uric acid, but chemical analysis did not confirm the supposition. Van der Hoeven refers to some observations by Vrolik; but as these are in Dutch, and have not, so far as I can find, been translated into either French, German, or English, I know not what they may contain.

In his more recent essay, translated in 'Wiegmann's Archiv' for 1857, under the title of "Beitrag zur Anatomie von *Nautilus pompilius*," Van der Hoeven states that he has again found hard concretions in the chamber enclosing the appendage of the anterior branchial artery, and that these on chemical analysis yielded phosphate of lime and traces of fat and albumen, but no uric acid.

Mr. Macdonald, in a valuable paper on the anatomy of *Nautilus umbilicatus*, published in the Philosophical Transactions for 1855, thus describes the follicular appendages of the branchial arteries:—

"These follicles are subcylindrical in form, somewhat dilated at the free extremity, to which is appended a folded and funnel-shaped process of membrane, which expands rather suddenly, presenting a jagged and irregular border. They open by a smooth and oval or slit-like, orifice into the afferent pulmonary vessels, on each of which, as Professor Owen has observed, they are disposed in three clusters. The outer membrane is smooth and glassy, homogeneous in structure and sprinkled over with minute rounded and transparent bodies, probably the nuclei of cells. Beneath this layer, flat bundles of fibres, apparently muscular, are traceable here and there, principally disposed in a longitudinal direction, and sometimes branched. The lining membrane consists of a loose epithelial pavement in many respects similar to that of the uriniferous tubules of the higher animals, the cells containing, besides the nuclei, numerous minute oil-globules, or a substance much resembling concrete fatty matter. This membrane is thrown up into an infinite number of papillæ and corrugations, so as to augment the extent of surface considerably. The papillæ are more numerous at the inner part or towards the attached end; and a circlet of longitudinally disposed folds radiate from the bottom of the follicles, in which a number of small pits or fenestrations are sometimes visible. The sides of these folds are wrinkled

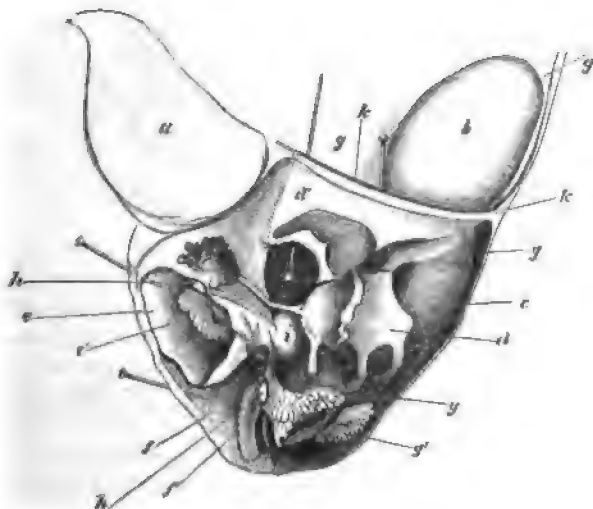
transversely so as to present a median zigzag elevation. The funnel-shaped membranous process above noticed is continuous with the lining membrane, consisting of an extension of the same epithelial pavement; but the cells are somewhat larger and more regular in form. The cavity of each follicle, therefore, communicates with the exterior through the centre of this process; and the aperture is thus guarded by a kind of circular valve, permitting the escape of secreted matter, but effectually preventing the entrance of fluid from without."

In his fig. 9, pl. xv., Mr. Macdonald depicts certain "crystalline bodies often occurring within the follicles."

From what Mr. Macdonald states, one would be led to conclude that all the follicles have the same structure; but I suspect this to be an oversight.

In the second edition of Professor Owen's Lectures on the Invertebrata (1855), I find no mention of Valenciennes' discovery

Nautilus pompilius. Fig. 1.



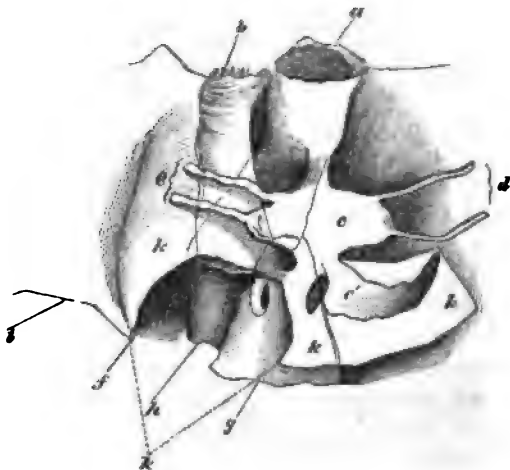
Viewed from the left side and a little behind.

Two of the anterior chambers, and the fifth or posterior chamber, laid open.
Natural size.

a. Shell muscle. *b.* Ovary. *c.* Intestine. *d.* Heart; *d'* its pyriform appendage. *e.* Superior anterior chamber; *e'* its follicles. *f.* Inferior anterior chamber; *f'* its follicles. *g.* Posterior chamber; *g'* follicles. *h.* Cut ends of branchial arteries. *i.* Termination of vena cava. *k.* Pallio-visceral ligament.

of the additional four apertures; but the author states that "on each side, at the roots of the anterior branchiæ, there is a small mamillary eminence with a transverse slit, which conducts from the branchial cavity to one of the compartments of the pericardium containing two clusters of venous glands. There are also two similar, but smaller, slits, contiguous to one another, near the root of the posterior branchia on each side, which lead to and may admit sea-water into the compartments containing the posterior cluster of the venous follicles." In this work the ovary is not only described, but *figured*, on the right side of the gizzard. The figure, however, rightly places the greater part of the ovary below that organ.

Nautilus pompilius. Fig. 2.



Natural Size.

The pallio-visceral ligament seen from below: torn on the right side to show the rectum and oviduct; cut through on the left side along the dotted line close to *d'* in the preceding figure.

- a.* Anus. *b.* Oviducal aperture. *c.* Heart. *d.* Left branchial veins. *e.* Right branchial veins. *f.* Oviduct cut through. *g.* Ovary. *h.* Rectum. *i.* Mantle. *k k k.* Pallio-visceral ligament; *k'* its torn portion. The oval "aperture for the siphonal artery" is seen to the left of *c'*, and the right-hand style in Fig. 1 passes through it.

On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection. By CHARLES DARWIN, Esq., F.R.S., F.L.S., & F.G.S., and ALFRED WALLACE, Esq. Communicated by Sir CHARLES LYELL, F.R.S., F.L.S., and J. D. HOOKER, Esq., M.D., V.P.R.S., F.L.S., &c.

[Read July 1st, 1858.]

London, June 30th, 1858.

MY DEAR SIR,—The accompanying papers, which we have the honour of communicating to the Linnean Society, and which all relate to the same subject, viz. the Laws which affect the Production of Varieties, Races, and Species, contain the results of the investigations of two indefatigable naturalists, Mr. Charles Darwin and Mr. Alfred Wallace.

These gentlemen having, independently and unknown to one another, conceived the same very ingenious theory to account for the appearance and perpetuation of varieties and of specific forms on our planet, may both fairly claim the merit of being original thinkers in this important line of inquiry; but neither of them having published his views, though Mr. Darwin has for many years past been repeatedly urged by us to do so, and both authors having now unreservedly placed their papers in our hands, we think it would best promote the interests of science that a selection from them should be laid before the Linnean Society.

Taken in the order of their dates, they consist of:—

1. Extracts from a MS. work on Species*, by Mr. Darwin, which was sketched in 1839, and copied in 1844, when the copy was read by Dr. Hooker, and its contents afterwards communicated to Sir Charles Lyell. The first Part is devoted to "The Variation of Organic Beings under Domestication and in their Natural State;" and the second chapter of that Part, from which we propose to read to the Society the extracts referred to, is headed, "On the Variation of Organic Beings in a state of Nature; on the Natural Means of Selection; on the Comparison of Domestic Races and true Species."

2. An abstract of a private letter addressed to Professor Asa Gray, of Boston, U.S., in October 1857, by Mr. Darwin, in which

* This MS. work was never intended for publication, and therefore was not written with care.—C. D. 1858.

he repeats his views, and which shows that these remained unaltered from 1839 to 1857.

8. An Essay by Mr. Wallace, entitled "On the Tendency of Varieties to depart indefinitely from the Original Type." This was written at Ternate in February 1858, for the perusal of his friend and correspondent Mr. Darwin, and sent to him with the expressed wish that it should be forwarded to Sir Charles Lyell, if Mr. Darwin thought it sufficiently novel and interesting. So highly did Mr. Darwin appreciate the value of the views therein set forth, that he proposed, in a letter to Sir Charles Lyell, to obtain Mr. Wallace's consent to allow the Essay to be published as soon as possible. Of this step we highly approved, provided Mr. Darwin did not withhold from the public, as he was strongly inclined to do (in favour of Mr. Wallace), the memoir which he had himself written on the same subject, and which, as before stated, one of us had perused in 1844, and the contents of which we had both of us been privy to for many years. On representing this to Mr. Darwin, he gave us permission to make what use we thought proper of his memoir, &c.; and in adopting our present course, of presenting it to the Linnean Society, we have explained to him that we are not solely considering the relative claims to priority of himself and his friend, but the interests of science generally; for we feel it to be desirable that views founded on a wide deduction from facts, and matured by years of reflection, should constitute at once a goal from which others may start, and that, while the scientific world is waiting for the appearance of Mr. Darwin's complete work, some of the leading results of his labours, as well as those of his able correspondent, should together be laid before the public.

We have the honour to be yours very obediently,

CHARLES LYELL.

JOS. D. HOOKER.

J. J. Bennett, Esq.,

Secretary of the Linnean Society.

- I. *Extract from an unpublished Work on Species, by C. DARWIN, Esq., consisting of a portion of a Chapter entitled, "On the Variation of Organic Beings in a state of Nature; on the Natural Means of Selection; on the Comparison of Domestic Races and true Species."*

De Candolle, in an eloquent passage, has declared that all nature is at war, one organism with another, or with external nature.

Seeing the contented face of nature, this may at first well be doubted; but reflection will inevitably prove it to be true. The war, however, is not constant, but recurrent in a slight degree at short periods, and more severely at occasional more distant periods; and hence its effects are easily overlooked. It is the doctrine of Malthus applied in most cases with tenfold force. As in every climate there are seasons, for each of its inhabitants, of greater and less abundance, so all annually breed; and the moral restraint which in some small degree checks the increase of mankind is entirely lost. Even slow-breeding mankind has doubled in twenty-five years; and if he could increase his food with greater ease, he would double in less time. But for animals without artificial means, the amount of food for each species must, *on an average*, be constant, whereas the increase of all organisms tends to be geometrical, and in a vast majority of cases at an enormous ratio. Suppose in a certain spot there are eight pairs of birds, and that *only* four pairs of them annually (including double hatches) rear only four young, and that these go on rearing their young at the same rate, then at the end of seven years (a short life, excluding violent deaths, for any bird) there will be 2048 birds, instead of the original sixteen. As this increase is quite impossible, we must conclude either that birds do not rear nearly half their young, or that the average life of a bird is, from accident, not nearly seven years. Both checks probably concur. The same kind of calculation applied to all plants and animals affords results more or less striking, but in very few instances more striking than in man.

Many practical illustrations of this rapid tendency to increase are on record, among which, during peculiar seasons, are the extraordinary numbers of certain animals; for instance, during the years 1826 to 1828, in La Plata, when from drought some millions of cattle perished, the whole country actually *swarmed* with mice. Now I think it cannot be doubted that during the breeding-season all the mice (with the exception of a few males or females in excess) ordinarily pair, and therefore that this astounding increase during three years must be attributed to a greater number than usual surviving the first year, and then breeding, and so on till the third year, when their numbers were brought down to their usual limits on the return of wet weather. Where man has introduced plants and animals into a new and favourable country, there are many accounts in how surprisingly few years the whole country has become stocked with them. This increase would

necessarily stop as soon as the country was fully stocked; and yet we have every reason to believe, from what is known of wild animals, that *all* would pair in the spring. In the majority of cases it is most difficult to imagine where the checks fall—though generally, no doubt, on the seeds, eggs, and young; but when we remember how impossible, even in mankind (so much better known than any other animal), it is to infer from repeated casual observations what the average duration of life is, or to discover the different percentage of deaths to births in different countries, we ought to feel no surprise at our being unable to discover where the check falls in any animal or plant. It should always be remembered, that in most cases the checks are recurrent yearly in a small, regular degree, and in an extreme degree during unusually cold, hot, dry, or wet years, according to the constitution of the being in question. Lighten any check in the least degree, and the geometrical powers of increase in every organism will almost instantly increase the average number of the favoured species. Nature may be compared to a surface on which rest ten thousand sharp wedges touching each other and driven inwards by incessant blows. Fully to realize these views much reflection is requisite. Malthus on man should be studied; and all such cases as those of the mice in La Plata, of the cattle and horses when first turned out in South America, of the birds by our calculation, &c., should be well considered. Reflect on the enormous multiplying power *inherent and annually in action* in all animals; reflect on the countless seeds scattered by a hundred ingenious contrivances, year after year, over the whole face of the land; and yet we have every reason to suppose that the average percentage of each of the inhabitants of a country usually remains constant. Finally, let it be borne in mind that this average number of individuals (the external conditions remaining the same) in each country is kept up by recurrent struggles against other species or against external nature (as on the borders of the Arctic regions, where the cold checks life), and that ordinarily each individual of every species holds its place, either by its own struggle and capacity of acquiring nourishment in some period of its life, from the egg upwards; or by the struggle of its parents (in short-lived organisms, when the main check occurs at longer intervals) with other individuals of the *same or different* species.

But let the external conditions of a country alter. If in a small degree, the relative proportions of the inhabitants will in most cases simply be slightly changed; but let the number of

inhabitants be small, as on an island, and free access to it from other countries be circumscribed, and let the change of conditions continue progressing (forming new stations), in such a case the original inhabitants must cease to be as perfectly adapted to the changed conditions as they were originally. It has been shown in a former part of this work, that such changes of external conditions would, from their acting on the reproductive system, probably cause the organization of those beings which were most affected to become, as under domestication, plastic. Now, can it be doubted, from the struggle each individual has to obtain subsistence, that any minute variation in structure, habits, or instincts, adapting that individual better to the new conditions, would tell upon its vigour and health? In the struggle it would have a better *chance* of surviving; and those of its offspring which inherited the variation, be it ever so slight, would also have a better *chance*. Yearly more are bred than can survive; the smallest grain in the balance, in the long run, must tell on which death shall fall, and which shall survive. Let this work of selection on the one hand, and death on the other, go on for a thousand generations, who will pretend to affirm that it would produce no effect, when we remember what, in a few years, Bakewell effected in cattle, and Western in sheep, by this identical principle of selection?

To give an imaginary example from changes in progress on an island:—let the organization of a canine animal which preyed chiefly on rabbits, but sometimes on hares, become slightly plastic; let these same changes cause the number of rabbits very slowly to decrease, and the number of hares to increase; the effect of this would be that the fox or dog would be driven to try to catch more hares: his organization, however, being slightly plastic, those individuals with the lightest forms, longest limbs, and best eyesight, let the difference be ever so small, would be slightly favoured, and would tend to live longer, and to survive during that time of the year when food was scarcest; they would also rear more young, which would tend to inherit these slight peculiarities. The less fleet ones would be rigidly destroyed. I can see no more reason to doubt that these causes in a thousand generations would produce a marked effect, and adapt the form of the fox or dog to the catching of hares instead of rabbits, than the greyhounds can be improved by selection and careful breeding. So would it be with plants under similar circumstances. If the number of individuals of a species with plumed seeds could be increased by greater powers of dissemination within its own area

(that is, if the check to increase fell chiefly on the seeds), those seeds which were provided with ever so little more down, would in the long run be most disseminated; hence a greater number of seeds thus formed would germinate, and would tend to produce plants inheriting the slightly better-adapted down*.

Besides this natural means of selection, by which those individuals are preserved, whether in their egg, or larval, or mature state, which are best adapted to the place they fill in nature, there is a second agency at work in most unisexual animals, tending to produce the same effect, namely, the struggle of the males for the females. These struggles are generally decided by the law of battle, but in the case of birds, apparently, by the charms of their song, by their beauty or their power of courtship, as in the dancing rock-thrush of Guiana. The most vigorous and healthy males, implying perfect adaptation, must generally gain the victory in their contests. This kind of selection, however, is less rigorous than the other; it does not require the death of the less successful, but gives to them fewer descendants. The struggle falls, moreover, at a time of year when food is generally abundant, and perhaps the effect chiefly produced would be the modification of the secondary sexual characters, which are not related to the power of obtaining food, or to defence from enemies, but to fighting with or rivalling other males. The result of this struggle amongst the males may be compared in some respects to that produced by those agriculturists who pay less attention to the careful selection of all their young animals, and more to the occasional use of a choice mate.

II. *Abstract of a Letter from C. DARWIN, Esq., to Prof. ASA GRAY, Boston, U.S., dated Down, September 5th, 1857.*

1. It is wonderful what the principle of selection by man, that is the picking out of individuals with any desired quality, and breeding from them, and again picking out, can do. Even breeders have been astounded at their own results. They can act on differences inappreciable to an uneducated eye. Selection has been *methodically* followed in *Europe* for only the last half century; but it was occasionally, and even in some degree methodically, followed in the most ancient times. There must have been also a kind of unconscious selection from a remote period, namely in

* I can see no more difficulty in this, than in the planter improving his varieties of the cotton plant.—C. D. 1858.

the preservation of the individual animals (without any thought of their offspring) most useful to each race of man in his particular circumstances. The "roguing," as nurserymen call the destroying of varieties which depart from their type, is a kind of selection. I am convinced that intentional and occasional selection has been the main agent in the production of our domestic races; but however this may be, its great power of modification has been indisputably shown in later times. Selection acts only by the accumulation of slight or greater variations, caused by external conditions, or by the mere fact that in generation the child is not absolutely similar to its parent. Man, by this power of accumulating variations, adapts living beings to his wants—may be said to make the wool of one sheep good for carpets, of another for cloth, &c.

2. Now suppose there were a being who did not judge by mere external appearances, but who could study the whole internal organization, who was never capricious, and should go on selecting for one object during millions of generations; who will say what he might not effect? In nature we have some *slight* variation occasionally in all parts; and I think it can be shown that changed conditions of existence is the main cause of the child not exactly resembling its parents; and in nature geology shows us what changes have taken place, and are taking place. We have almost unlimited time; no one but a practical geologist can fully appreciate this. Think of the Glacial period, during the whole of which the same species at least of shells have existed; there must have been during this period millions on millions of generations.

3. I think it can be shown that there is such an unerring power at work in *Natural Selection* (the title of my book), which selects exclusively for the good of each organic being. The elder De Candolle, W. Herbert, and Lyell have written excellently on the struggle for life; but even they have not written strongly enough. Reflect that every being (even the elephant) breeds at such a rate, that in a few years, or at most a few centuries, the surface of the earth would not hold the progeny of one pair. I have found it hard constantly to bear in mind that the increase of every single species is checked during some part of its life, or during some shortly recurrent generation. Only a few of those annually born can live to propagate their kind. What a trifling difference must often determine which shall survive, and which perish!

4. Now take the case of a country undergoing some change. This will tend to cause some of its inhabitants to vary slightly—

not but that I believe most beings vary at all times enough for selection to act on them. Some of its inhabitants will be exterminated; and the remainder will be exposed to the mutual action of a different set of inhabitants, which I believe to be far more important to the life of each being than mere climate. Considering the infinitely various methods which living beings follow to obtain food by struggling with other organisms, to escape danger at various times of life, to have their eggs or seeds disseminated, &c. &c., I cannot doubt that during millions of generations individuals of a species will be occasionally born with some slight variation, profitable to some part of their economy. Such individuals will have a better chance of surviving, and of propagating their new and slightly different structure; and the modification may be slowly increased by the accumulative action of natural selection to any profitable extent. The variety thus formed will either coexist with, or, more commonly, will exterminate its parent form. An organic being, like the woodpecker or misseltree, may thus come to be adapted to a score of contingences—natural selection accumulating those slight variations in all parts of its structure, which are in any way useful to it during any part of its life.

5. Multifarious difficulties will occur to every one, with respect to this theory. Many can, I think, be satisfactorily answered. *Natura non facit saltum* answers some of the most obvious. The slowness of the change, and only a very few individuals undergoing change at any one time, answers others. The extreme imperfection of our geological records answers others.

6. Another principle, which may be called the principle of divergence, plays, I believe, an important part in the origin of species. The same spot will support more life if occupied by very diverse forms. We see this in the many generic forms in a square yard of turf, and in the plants or insects on any little uniform islet, belonging almost invariably to as many genera and families as species. We can understand the meaning of this fact amongst the higher animals, whose habits we understand. We know that it has been experimentally shown that a plot of land will yield a greater weight if sown with several species and genera of grasses, than if sown with only two or three species. Now, every organic being, by propagating so rapidly, may be said to be striving its utmost to increase in numbers. So it will be with the offspring of any species after it has become diversified into varieties, or subspecies, or true species. And it follows, I think, from the foregoing facts, that the varying offspring of each species will try

(only few will succeed) to seize on as many and as diverse places in the economy of nature as possible. Each new variety or species, when formed, will generally take the place of, and thus exterminate its less well-fitted parent. This I believe to be the origin of the classification and affinities of organic beings at all times; for organic beings always *seem* to branch and sub-branch like the limbs of a tree from a common trunk, the flourishing and diverging twigs destroying the less vigorous—the dead and lost branches rudely representing extinct genera and families.

This sketch is *most* imperfect; but in so short a space I cannot make it better. Your imagination must fill up very wide blanks.

C. DARWIN.

III. *On the Tendency of Varieties to depart indefinitely from the Original Type.* By ALFRED RUSSEL WALLACE.

One of the strongest arguments which have been adduced to prove the original and permanent distinctness of species is, that *varieties* produced in a state of domesticity are more or less unstable, and often have a tendency, if left to themselves, to return to the normal form of the parent species; and this instability is considered to be a distinctive peculiarity of all varieties, even of those occurring among wild animals in a state of nature, and to constitute a provision for preserving unchanged the originally created distinct species.

In the absence or scarcity of facts and observations as to *varieties* occurring among wild animals, this argument has had great weight with naturalists, and has led to a very general and somewhat prejudiced belief in the stability of species. Equally general, however, is the belief in what are called “permanent or true varieties,”—races of animals which continually propagate their like, but which differ so slightly (although constantly) from some other race, that the one is considered to be a *variety* of the other. Which is the *variety* and which the original *species*, there is generally no means of determining, except in those rare cases in which the one race has been known to produce an offspring unlike itself and resembling the other. This, however, would seem quite incompatible with the “permanent invariability of species,” but the difficulty is overcome by assuming that such varieties have strict limits, and can never again vary further from the original type, although they may return to it, which, from the

analogy of the domesticated animals, is considered to be highly probable, if not certainly proved.

It will be observed that this argument rests entirely on the assumption, that *varieties* occurring in a state of nature are in all respects analogous to or even identical with those of domestic animals, and are governed by the same laws as regards their permanence or further variation. But it is the object of the present paper to show that this assumption is altogether false, that there is a general principle in nature which will cause many *varieties* to survive the parent species, and to give rise to successive variations departing further and further from the original type, and which also produces, in domesticated animals, the tendency of varieties to return to the parent form.

The life of wild animals is a struggle for existence. The full exertion of all their faculties and all their energies is required to preserve their own existence and provide for that of their infant offspring. The possibility of procuring food during the least favourable seasons, and of escaping the attacks of their most dangerous enemies, are the primary conditions which determine the existence both of individuals and of entire species. These conditions will also determine the population of a species; and by a careful consideration of all the circumstances we may be enabled to comprehend, and in some degree to explain, what at first sight appears so inexplicable—the excessive abundance of some species, while others closely allied to them are very rare.

The general proportion that must obtain between certain groups of animals is readily seen. Large animals cannot be so abundant as small ones; the carnivora must be less numerous than the herbivora; eagles and lions can never be so plentiful as pigeons and antelopes; the wild asses of the Tartarian deserts cannot equal in numbers the horses of the more luxuriant prairies and pampas of America. The greater or less fecundity of an animal is often considered to be one of the chief causes of its abundance or scarcity; but a consideration of the facts will show us that it really has little or nothing to do with the matter. Even the least prolific of animals would increase rapidly if unchecked, whereas it is evident that the animal population of the globe must be stationary, or perhaps, through the influence of man, decreasing. Fluctuations there may be; but permanent increase, except in restricted localities, is almost impossible. For example, our own observation must convince us that birds do not go on increasing every year in a geometrical ratio, as they would do, were there not

some powerful check to their natural increase. Very few birds produce less than two young ones each year, while many have six, eight, or ten; four will certainly be below the average; and if we suppose that each pair produces young only four times in their life, that will also be below the average, supposing them not to die either by violence or want of food. Yet at this rate how tremendous would be the increase in a few years from a single pair! A simple calculation will show that in fifteen years each pair of birds would have increased to nearly ten millions! whereas we have no reason to believe that the number of the birds of any country increases at all in fifteen or in one hundred and fifty years. With such powers of increase the population must have reached its limits, and have become stationary, in a very few years after the origin of each species. It is evident, therefore, that each year an immense number of birds must perish—as many in fact as are born; and as on the lowest calculation the progeny are each year twice as numerous as their parents, it follows that, whatever be the average number of individuals existing in any given country, *twice that number must perish annually*,—a striking result, but one which seems at least highly probable, and is perhaps under rather than over the truth. It would therefore appear that, as far as the continuance of the species and the keeping up the average number of individuals are concerned, large broods are superfluous. On the average all above *one* become food for hawks and kites, wild cats and weasels, or perish of cold and hunger as winter comes on. This is strikingly proved by the case of particular species; for we find that their abundance in individuals bears no relation whatever to their fertility in producing offspring. Perhaps the most remarkable instance of an immense bird population is that of the passenger pigeon of the United States, which lays only one, or at most two eggs, and is said to rear generally but one young one. Why is this bird so extraordinarily abundant, while others producing two or three times as many young are much less plentiful? The explanation is not difficult. The food most congenial to this species, and on which it thrives best, is abundantly distributed over a very extensive region, offering such differences of soil and climate, that in one part or another of the area the supply never fails. The bird is capable of a very rapid and long-continued flight, so that it can pass without fatigue over the whole of the district it inhabits, and as soon as the supply of food begins to fail in one place is able to discover a fresh feeding-ground. This example strikingly shows us that the procuring a constant supply

of wholesome food is almost the sole condition requisite for ensuring the rapid increase of a given species, since neither the limited fecundity, nor the unrestrained attacks of birds of prey and of man are here sufficient to check it. In no other birds are these peculiar circumstances so strikingly combined. Either their food is more liable to failure, or they have not sufficient power of wing to search for it over an extensive area, or during some season of the year it becomes very scarce, and less wholesome substitutes have to be found; and thus, though more fertile in offspring, they can never increase beyond the supply of food in the least favourable seasons. Many birds can only exist by migrating, when their food becomes scarce, to regions possessing a milder, or at least a different climate, though, as these migrating birds are seldom excessively abundant, it is evident that the countries they visit are still deficient in a constant and abundant supply of wholesome food. Those whose organization does not permit them to migrate when their food becomes periodically scarce, can never attain a large population. This is probably the reason why woodpeckers are scarce with us, while in the tropics they are among the most abundant of solitary birds. Thus the house sparrow is more abundant than the redbreast, because its food is more constant and plentiful,—seeds of grasses being preserved during the winter, and our farm-yards and stubble-fields furnishing an almost inexhaustible supply. Why, as a general rule, are aquatic, and especially sea birds, very numerous in individuals? Not because they are more prolific than others, generally the contrary; but because their food never fails, the sea-shores and river-banks daily swarming with a fresh supply of small mollusca and crustacea. Exactly the same laws will apply to mammals. Wild cats are prolific and have few enemies; why then are they never as abundant as rabbits? The only intelligible answer is, that their supply of food is more precarious. It appears evident, therefore, that so long as a country remains physically unchanged, the numbers of its animal population cannot materially increase. If one species does so, some others requiring the same kind of food must diminish in proportion. The numbers that die annually must be immense; and as the individual existence of each animal depends upon itself, those that die must be the weakest—the very young, the aged, and the diseased,—while those that prolong their existence can only be the most perfect in health and vigour—those who are best able to obtain food regularly, and avoid their numerous enemies. It is, as we commenced by remarking, “a struggle for existence,” in

which the weakest and least perfectly organized must always succumb.

Now it is clear that what takes place among the individuals of a species must also occur among the several allied species of a group,—viz. that those which are best adapted to obtain a regular supply of food, and to defend themselves against the attacks of their enemies and the vicissitudes of the seasons, must necessarily obtain and preserve a superiority in population; while those species which from some defect of power or organization are the least capable of counteracting the vicissitudes of food, supply, &c., must diminish in numbers, and, in extreme cases, become altogether extinct. Between these extremes the species will present various degrees of capacity for ensuring the means of preserving life; and it is thus we account for the abundance or rarity of species. Our ignorance will generally prevent us from accurately tracing the effects to their causes; but could we become perfectly acquainted with the organization and habits of the various species of animals, and could we measure the capacity of each for performing the different acts necessary to its safety and existence under all the varying circumstances by which it is surrounded, we might be able even to calculate the proportionate abundance of individuals which is the necessary result.

If now we have succeeded in establishing these two points—1st, *that the animal population of a country is generally stationary, being kept down by a periodical deficiency of food, and other checks*; and, 2nd, *that the comparative abundance or scarcity of the individuals of the several species is entirely due to their organization and resulting habits, which, rendering it more difficult to procure a regular supply of food and to provide for their personal safety in some cases than in others, can only be balanced by a difference in the population which have to exist in a given area*—we shall be in a condition to proceed to the consideration of *varieties*, to which the preceding remarks have a direct and very important application.

Most or perhaps all the variations from the typical form of a species must have some definite effect, however slight, on the habits or capacities of the individuals. Even a change of colour might, by rendering them more or less distinguishable, affect their safety; a greater or less development of hair might modify their habits. More important changes, such as an increase in the power or dimensions of the limbs or any of the external organs, would more or less affect their mode of procuring food or the range of

country which they inhabit. It is also evident that most changes would affect, either favourably or adversely, the powers of prolonging existence. An antelope with shorter or weaker legs must necessarily suffer more from the attacks of the feline carnivora; the passenger pigeon with less powerful wings would sooner or later be affected in its powers of procuring a regular supply of food; and in both cases the result must necessarily be a diminution of the population of the modified species. If, on the other hand, any species should produce a variety having slightly increased powers of preserving existence, that variety must inevitably in time acquire a superiority in numbers. These results must follow as surely as old age, intemperance, or scarcity of food produce an increased mortality. In both cases there may be many individual exceptions; but on the average the rule will invariably be found to hold good. All varieties will therefore fall into two classes—those which under the same conditions would never reach the population of the parent species, and those which would in time obtain and keep a numerical superiority. Now, let some alteration of physical conditions occur in the district—a long period of drought, a destruction of vegetation by locusts, the irruption of some new carnivorous animal seeking “pastures new”—any change in fact tending to render existence more difficult to the species in question, and tasking its utmost powers to avoid complete extermination; it is evident that, of all the individuals composing the species, those forming the least numerous and most feebly organized variety would suffer first, and, were the pressure severe, must soon become extinct. The same causes continuing in action, the parent species would next suffer, would gradually diminish in numbers, and with a recurrence of similar unfavourable conditions might also become extinct. The superior variety would then alone remain, and on a return to favourable circumstances would rapidly increase in numbers and occupy the place of the extinct species and variety.

The *variety* would now have replaced the *species*, of which it would be a more perfectly developed and more highly organized form. It would be in all respects better adapted to secure its safety, and to prolong its individual existence and that of the race. Such a *variety could not* return to the original form; for that form is an inferior one, and could never compete with it for existence. Granted, therefore, a “tendency” to reproduce the original type of the species, still the variety must ever remain preponderant in numbers, and under adverse physical conditions *again alone survive*.

But this new, improved, and populous race might itself, in course of time, give rise to new varieties, exhibiting several diverging modifications of form, any of which, tending to increase the facilities for preserving existence, must, by the same general law, in their turn become predominant. Here, then, we have *progression and continued divergence* deduced from the general laws which regulate the existence of animals in a state of nature, and from the undisputed fact that varieties do frequently occur. It is not, however, contended that this result would be invariable; a change of physical conditions in the district might at times materially modify it, rendering the race which had been the most capable of supporting existence under the former conditions now the least so, and even causing the extinction of the newer and, for a time, superior race, while the old or parent species and its first inferior varieties continued to flourish. Variations in unimportant parts might also occur, having no perceptible effect on the life-preserving powers; and the varieties so furnished might run a course parallel with the parent species, either giving rise to further variations or returning to the former type. All we argue for is, that certain varieties have a tendency to maintain their existence longer than the original species, and this tendency must make itself felt; for though the doctrine of chances or averages can never be trusted to on a limited scale, yet, if applied to high numbers, the results come nearer to what theory demands, and, as we approach to an infinity of examples, become strictly accurate. Now the scale on which nature works is so vast—the numbers of individuals and periods of time with which she deals approach so near to infinity, that any cause, however slight, and however liable to be veiled and counteracted by accidental circumstances, must in the end produce its full legitimate results.

Let us now turn to domesticated animals, and inquire how varieties produced among them are affected by the principles here enunciated. The essential difference in the condition of wild and domestic animals is this,—that among the former, their well-being and very existence depend upon the full exercise and healthy condition of all their senses and physical powers, whereas, among the latter, these are only partially exercised, and in some cases are absolutely unused. A wild animal has to search, and often to labour, for every mouthful of food—to exercise sight, hearing, and smell in seeking it, and in avoiding dangers, in procuring shelter from the inclemency of the seasons, and in providing for the subsistence and safety of its offspring. There is no muscle of

its body that is not called into daily and hourly activity ; there is no sense or faculty that is not strengthened by continual exercise. The domestic animal, on the other hand, has food provided for it, is sheltered, and often confined, to guard it against the vicissitudes of the seasons, is carefully secured from the attacks of its natural enemies, and seldom even rears its young without human assistance. Half of its senses and faculties are quite useless ; and the other half are but occasionally called into feeble exercise, while even its muscular system is only irregularly called into action.

Now when a variety of such an animal occurs, having increased power or capacity in any organ or sense, such increase is totally useless, is never called into action, and may even exist without the animal ever becoming aware of it. In the wild animal, on the contrary, all its faculties and powers being brought into full action for the necessities of existence, any increase becomes immediately available, is strengthened by exercise, and must even slightly modify the food, the habits, and the whole economy of the race. It creates as it were a new animal, one of superior powers, and which will necessarily increase in numbers and outlive those inferior to it.

Again, in the domesticated animal all variations have an equal chance of continuance ; and those which would decidedly render a wild animal unable to compete with its fellows and continue its existence are no disadvantage whatever in a state of domesticity. Our quickly fattening pigs, short-legged sheep, pouter pigeons, and poodle dogs could never have come into existence in a state of nature, because the very first step towards such inferior forms would have led to the rapid extinction of the race ; still less could they now exist in competition with their wild allies. The great speed but slight endurance of the race horse, the unwieldy strength of the ploughman's team, would both be useless in a state of nature. If turned wild on the pampas, such animals would probably soon become extinct, or under favourable circumstances might each lose those extreme qualities which would never be called into action, and in a few generations would revert to a common type, which must be that in which the various powers and faculties are so proportioned to each other as to be best adapted to procure food and secure safety,—that in which by the full exercise of every part of his organization the animal can alone continue to live. Domestic varieties, when turned wild, *must* return to something near the type of the original wild stock, or *become altogether extinct*.

We see, then, that no inferences as to varieties in a state of nature can be deduced from the observation of those occurring among domestic animals. The two are so much opposed to each other in every circumstance of their existence, that what applies to the one is almost sure not to apply to the other. Domestic animals are abnormal, irregular, artificial; they are subject to varieties which never occur and never can occur in a state of nature: their very existence depends altogether on human care; so far are many of them removed from that just proportion of faculties, that true balance of organization, by means of which alone an animal left to its own resources can preserve its existence and continue its race.

The hypothesis of Lamarck—that progressive changes in species have been produced by the attempts of animals to increase the development of their own organs, and thus modify their structure and habits—has been repeatedly and easily refuted by all writers on the subject of varieties and species, and it seems to have been considered that when this was done the whole question has been finally settled; but the view here developed renders such an hypothesis quite unnecessary, by showing that similar results must be produced by the action of principles constantly at work in nature. The powerful retractile talons of the falcon and the cat-tribes have not been produced or increased by the volition of those animals; but among the different varieties which occurred in the earlier and less highly organized forms of these groups, *those always survived longest which had the greatest facilities for seizing their prey*. Neither did the giraffe acquire its long neck by desiring to reach the foliage of the more lofty shrubs, and constantly stretching its neck for the purpose, but because any varieties which occurred among its antitypes with a longer neck than usual *at once secured a fresh range of pasture over the same ground as their shorter-necked companions, and on the first scarcity of food were thereby enabled to outlive them*. Even the peculiar colours of many animals, especially insects, so closely resembling the soil or the leaves or the trunks on which they habitually reside, are explained on the same principle; for though in the course of ages varieties of many tints may have occurred, *yet those races having colours best adapted to concealment from their enemies would inevitably survive the longest*. We have also here an acting cause to account for that balance so often observed in nature,—a deficiency in one set of organs always being compensated by an increased development of some others—powerful wings accompanying weak

feet, or great velocity making up for the absence of defensive weapons; for it has been shown that all varieties in which an unbalanced deficiency occurred could not long continue their existence. The action of this principle is exactly like that of the centrifugal governor of the steam engine, which checks and corrects any irregularities almost before they become evident; and in like manner no unbalanced deficiency in the animal kingdom can ever reach any conspicuous magnitude, because it would make itself felt at the very first step, by rendering existence difficult and extinction almost sure soon to follow. An origin such as is here advocated will also agree with the peculiar character of the modifications of form and structure which obtain in organized beings—the many lines of divergence from a central type, the increasing efficiency and power of a particular organ through a succession of allied species, and the remarkable persistence of unimportant parts such as colour, texture of plumage and hair, form of horns or crests, through a series of species differing considerably in more essential characters. It also furnishes us with a reason for that "more specialized structure" which Professor Owen states to be a characteristic of recent compared with extinct forms, and which would evidently be the result of the progressive modification of any organ applied to a special purpose in the animal economy.

We believe we have now shown that there is a tendency in nature to the continued progression of certain classes of *varieties* further and further from the original type—a progression to which there appears no reason to assign any definite limits—and that the same principle which produces this result in a state of nature will also explain why domestic varieties have a tendency to revert to the original type. This progression, by minute steps, in various directions, but always checked and balanced by the necessary conditions, subject to which alone existence can be preserved, may, it is believed, be followed out so as to agree with all the phenomena presented by organized beings, their extinction and succession in past ages, and all the extraordinary modifications of form, instinct, and habits which they exhibit.

Ternate, February, 1853.

Contributions to the Anatomy and Natural History of the Cetacea. By R. KNOX, Esq., M.D., F.R.S.E. Communicated by the Secretary.

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Part I. THE DOLPHINS.

THE dissection of the Cetacea, and more especially of the larger kinds, is attended with great difficulty, and not unfrequently entails heavy expenses on those who attempt it. For these reasons I have thought that zoologists might be pleased to have, even now, submitted to them the results of numerous dissections made many years ago, when, not stinted in means, and having the aid of excellent assistants, I attempted the dissection even of the gigantic Arctic Rorqual, the largest, perhaps, of all living beings. Certain of the details have been from time to time laid before the public, but in an extremely scattered and incomplete form, and without the illustrations (artistic), which explain so much better than any verbal description. The greater part is still before me in manuscript. It is my intention in the following contributions to endeavour to connect them together, adding to those already published many facts I find in MSS. The original drawings, made by my brother and by Messrs. Edward Forbes and Henry Goodair (who were at that time my students and assistants), are still in my possession.

Determination of Species.—The determination of species as regards the *Cetacea* is one of much difficulty; Cuvier met this difficulty by an appeal to anatomy. The number of vertebræ composing the vertebral column (exclusive of the cephalic) seemed to me a tolerably secure guide in the determination of species,—being aware, however, that some doubted the method, believing that the number of the vertebræ might vary, first, with the individual, secondly with the age of the specimen. I still continue to be of my original opinion, that the number of vertebræ comprising the vertebral column, properly so called, may safely be trusted in determining the species of the *Cetacea*; and with this view I drew up the following Table, excepting from it the genus *Dugong*, which I have never considered to be a Cetacean :—

Tabular View of the Number of the Vertebrae in certain Cetacea.
(Cephalic vertebrae excluded.)

SPECIES.	Authorities.				
	CUVIER.	RUDOLPHI.	KNOX.	J. HUNTER.	HUNTER (Glasgow.)
1. MYSTICETUS.					
Skeleton of the fœtus (the cervical reckoned as 7) of the <i>Mysticetus</i> <i>borealis</i> , Greenland.....			48		
Adult <i>Mysticetus</i> , Whale of Commerce.....	unknown				
<i>B. Mysticetus australis</i> , True Whale of the Cape Seas.....	59				
2. BALÆNOPTERA.					
Gigantic Northern Ror- qual.....			65		
Specimen of Rorqual de- scribed by Rudolphi.....		54			
<i>B. rostrata</i> of Fabri- cius; on the authority of Van Beneden:					
A. Rorqual.....					48
Great Whale at Ant- werp. Van Beneden. Species not stated....					61 or 62.
The lesser Rorqual of the North.....			48	46	46
Great Rorqual of the Cape.....	52				
3. PHYLÆTER.					
Sperm Whale or Ca- chalot.....	60				
4. DELPHINUS.					
<i>D. Delphis</i>	67				
<i>D. Delphis</i> . In my museum.....			81		
<i>D. Delphis</i> . In the Museum of Dr. R. Hunter, Glasgow.....					90
<i>D. Delphis</i> . Dissected by John Hunter.....				60 51	
<i>D. Phocæna</i>	66		65		
<i>D. Ebsenii</i> . Van Bene- den.....					90

In a late number of the 'Bulletins of the Royal Academy of Brussels' I find some valuable remarks in respect of these points by M. Van Beneden. He praises, and deservedly, no doubt, the exertions of M. Eschricht to collect a proper Museum of the Cetacea. It appears, according to M. Eschricht, that at no age whatever do we find in true whales (meaning, I presume, the

Mysticetus borealis and *australis*) any distinct vertebræ in the cervical region as in other mammals. A fusion of all into one bone or cartilage seems to take place even in the youngest fœtus. In the fœtus examined by me of this species (a specimen removed from the uterus of a true *Mysticetus* killed in the Greenland seas), I do not recollect the precise appearance of the cervical vertebræ; but the skeleton is in existence, and shall be referred to. To the skeleton of the Rorqual now in the Museum at Antwerp, and which seems to me of the same species as the one I dissected in Scotland (and of which the skeleton, prepared with infinite care by my brother and myself, was presented by me to the Town Council of Edinburgh, and is now preserved in the Zoological Gardens of the same city), he gives the following vertebræ:—

Skeleton of the Rorqual at Antwerp—Cervical ..	7
Dorsal ..	14–15
Lumbar ..	15
Caudal ..	25*
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Total	61 or 62

In the skeleton of the Great Rorqual now in the Zoological Gardens at Edinburgh, and originally dissected and prepared by my brother and myself, these vertebræ are—

Cervical	7
Dorsal	15
Lumbar and Caudal	43
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Total....	65

In that of the Lesser Rorqual I dissected in 1830, the skeleton of which I think is still preserved in the Museum of the University of Edinburgh, we found—

	Vertebræ.
Cervical	7
Dorsal	11
Lumbar	13
Caudal	17
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Total.....	48

The specimen was that of a young animal, and of the same species,

* It is stated that some of the last of these are of wood. The skeleton in Edinburgh is perfect.

I believe, as the one described by Mr. Hunter and Fabricius ; it is a distinct species, and not merely the young of the Great Rorqual.

I shall return to the Dugong, as not being a Cetacean, in a future Section : its skeleton has been examined in a masterly way by De Blainville, an anatomist and observer of the highest order, since the time I wrote and published my Memoir on the Dugong.

The first great step in the anatomy of the Cetacea is unquestionably due to Cuvier ; but his dissections were almost confined to the genus *Delphinus*, or the common Porpoise of our coasts. I repeated all his dissections, and found them, as they almost always were, scrupulously exact ; but when I came to examine Cetacea with whalebone instead of teeth, I was surprised to find how different, in fact, the anatomy of the two great families was. Scarcely in any great natural family do we find Cuvier's favourite theory of anatomical and physiological co-relations so entirely at fault as in the Cetacea. The teeth or whalebone, as natural-history characters, lead to no results ; the whole structure of the interior defies all *à-priori* reasoning. The brain in whalebone-whales does not fill the interior of the cranium ; so that the capacity of the one is no measure of the solid bulk of the other. Their food is various, having no relation to the teeth or buccal appendages ; vascular structures surround the spinal marrow, and extend in the *Balaenoptera* into the cavity of the cranium, which seem to be without any analogy in other mammals, or, at the least, a very obscure one, and whose functions are wholly unknown.

Cetacea might with some propriety be divided into whales with whalebone, and whales with teeth. Those with whalebone have rudimentary teeth in both jaws in the fœtal state. Fossil Cetacea exist, and they seem to have been of both kinds, but, no doubt, were generically and specifically distinct from the recent. Judging from the remains of those I have seen, I am inclined to think that those with teeth were of a stronger and firmer build in the skeleton than those called recent ; that the neck was longer, and the caudal portion of the column shorter than in the recent kinds, and that they approached the Saurians in form. There is a remarkable want of symmetry in the crania of some of the Cetacea ; but most remarkable is the cranium of the Narwhal. Of this fact I have already spoken, in the article published in the Transactions of the Royal Society of Edinburgh.

Delphinus Phocaena. Dissection of a small Cetacean sent to me from Orkney in the month of May 1835.—This species is said to abound on the coasts, and to furnish a kind of fishery to the in-

habitants. On dissection we found 81 vertebræ, exclusive of the cephalic. The species must be quite distinct from those previously and subsequently examined by myself and many others, in which the number of vertebræ ranged from 61 to 66. It is also, I think, distinct from the specimen I saw in Dr. R. Hunter's Museum in Glasgow, in which the number of vertebræ was 90, exclusive of the cephalic in all the cases. Thus it stands with regard to the Cetacea called Porpoises and Dolphins.

In certain species of *Delphinus* the vertical column is composed of 61 vertebræ, in others of 65, in others of 66, in others of 81, in others of 90.

The specimen I now describe was, no doubt, that of a young animal; and the skeleton was prepared, consequently, as a natural one. This method has the advantage of security against the loss of any important osseous structures, which too frequently happens when the bones require to be macerated. The bones contained little oil, and weighed, head included, only $7\frac{1}{2}$ lbs.; the whole animal, when entire, weighed 14 stone, or 196 lbs.; the skeleton therefore was about a twenty-fourth part of the whole weight. It was a female. The external nostrils terminated in a single orifice of a semilunar shape, with the concavity turned towards the snout. Measurements of young animals have not the importance of those of the adult; but I give them here because I think that the specimen, although young, had nearly attained its full growth:—

	ft.	in.
Total length over the dorsum	6	$5\frac{3}{4}$
" " lateral surface	6	$11\frac{1}{2}$
" " abdominal surface	6	$11\frac{1}{2}$
From the snout to the nostrils	0	$11\frac{1}{2}$
From the nostrils to the dorsal fin	1	$6\frac{1}{2}$
Base of the dorsal fin	0	11
From dorsal fin to foot of tail	3	$0\frac{3}{4}$
Breadth of pectoral limb	0	$4\frac{1}{2}$
From the snout to the organs of generation ..	3	$9\frac{1}{2}$
Circumference anterior to the arm	2	9
" " dorsal fin	3	$2\frac{1}{2}$
" posterior to dorsal fin	2	10
" at setting on of the tail	0	$8\frac{1}{4}$
Length of pectoral limb	0	10
Breadth of tail	1	2
Greatest height of the dorsal fin	0	9

From the notes taken at the time, I find that my brother remarks that the Dolphin of Orkney differed a good deal in shape from those found in the Forth and seas in the South of Scotland. There were, moreover, 16 more vertebræ than in the skeleton of the Common Porpoise of authors. The teeth generally weighed $2\frac{1}{2}$ grains each.

Further, the muscles of the tongue, intrinsic as well as extrinsic, were extremely well developed. The isthmus faucium was 3 inches long. All this part was extremely glandular. A well-marked muscular gullet followed, composed of two layers of muscular fibres,—one circular internally, and one longitudinal externally. These latter sent a slip to the base of the arytsenoid cartilages. The mucous membrane of the gullet had no true epidermic covering, and in this respect differed remarkably from the first gastric compartment, from which a cuticular lining could be peeled off, as strong as that from the sole of the foot in man. The larynx presented that organization so well described by the illustrious Cuvier, and which I believe to be peculiar to the whales with teeth. It differs very much, as I explained long ago, in its arrangement from that of Whalebone Whales,—a fact of which I think Cuvier was not aware. The cricoid cartilage was imperfect in form; the hyo-epiglottic muscles very strong. The proper arytsenoid were present, and strong, but did not extend so high as in man; the thyro-arytsenoid muscles were very fully developed. In the interior of the larynx there were no projections nor ventricles, no cuneiform cartilages, nor cornicula laryngis. The rings of the trachea formed complete circles.

Stomach.—The cuticular lining is limited to the first cavity or compartment. It is in the second compartment that is found the curious glandular arrangement first, I believe, described by me in the 'Transactions of the Royal Society of Edinburgh.' This structure is most probably not limited to the second compartment. There are four distinct compartments in the stomach of this animal. A dilated duodenum follows, 6 inches in length. It is possible that this may have been in some instances mistaken for a stomach. The valvulæ conniventes commence with the jejunum; these are longitudinal, and extend to within about 6 inches of the anus, terminating at a point where the intestine seems enlarged. The length of the intestines, large and small, was 90 feet; circumference generally about 2 inches. Thousands and tens of thousands of parasitical worms were found in the stomach, but none in the intestine. In the stomach also we found four mandibles of

the cuttlefish, but no remains of anything in the intestines, and no parasites.

Heart and Vessels.—The heart weighed exactly one pound. The Eustachian valve was small, that of Thebesius imperfect. The aorta proceeded for about 3 inches of its course before giving off any branches. At a point corresponding to the 15th or 16th lumbar vertebra the vessel divided into the common iliacs. The *art. sacri media*, its continuation, continued its course protected by the V-bones, and giving off branches corresponding to the intervertebral spaces.

Brain and Nervous System.—The erectile tissue surrounding the spinal cord and origin of the spinal nerves in the Cetacea did not extend into the interior of the cranium. The entire encephalic mass weighed $2\frac{1}{2}$ lbs.: cerebrum, 2 lbs.; cerebellum, $\frac{1}{4}$; pons and medulla, $\frac{1}{4}=2\frac{1}{2}$. Compared with a drawing of Camper of the *Delphinus Phocaena*, the brain was found to differ remarkably, in being much broader in the line of the middle and posterior lobes. In no animal did I ever find the fibrous structure of the brain so well marked; and this extended to the cerebellum*. I give here some measurements of the brain, which may be of use to future observers. The brain is short from before backwards, but broad transversely:—

Antero-posterior diameter	5 $\frac{1}{2}$ inches.
Breadth	8 "
Greatest breadth of the cerebellum	4 "
Length of the cerebellar hemisphere	4 $\frac{1}{2}$ "
Depth of ditto	3 $\frac{1}{2}$ "
Weight of the encephalic mass	2 $\frac{1}{2}$ lbs.
Depth of the interhemispherical fissure	1 $\frac{1}{2}$ inches.
Length of the corpus callosum	1 $\frac{1}{2}$ "
Weight of cerebrum	2
" cerebellum	0 $\frac{1}{4}$
" the pons and med. oblongata	0 $\frac{1}{4}$
} = 2 $\frac{1}{2}$ lbs.	

Nerves.—The 7th pair was found to be unexpectedly large and firm, including both portions. The anterior roots of the spinal nerves were far more numerous than the posterior or dorsal.

* "The substance of the brain is more visibly fibrous than I ever saw it in any other animal, the fibres passing from the ventricles as from a centre to the circumference, which fibrous texture is also continued through the cortical substance."—HUNTER, "On Whales," 'Animal Economy,' Palmer's edit. p. 373.

Muscles.—The panniculus carnosus, strong and fleshy, extended nearly over the whole trunk. The recti abdominis were powerful, and attached inferiorly in this way:—A portion runs to the pelvic bones; a much stronger to a strong aponeurosis, situated between the anus and the root of the tail.

The erector muscles of the spine (sacrolumbalis, longissimus dorsi and multifidus spinæ) weighed fully 16 lbs. They had but slender costal attachments; but their spinal (small delicate tendons) were innumerable. The scaleni were very large; and the vessels held the same relation to them as in man. The serratus magnus was comparatively small. The larger rhomboid had no spinal attachment; the minor rhomboid seemed to be the larger of the two. The pectorals were comparatively small. The adipose tissue appeared to be wholly confined to the subcutaneous region. The muscles were of a deep brown colour, full of blood, with a short, dark, and well-flavoured fibre: when cooked, they had a strong resemblance in flavour and taste to the flesh of the hare.

Part II. THE BALÆNA WHALES, OR WHALES WITH WHALEBONE.

In February 1834 a young whale of the family of Balæna Whales was caught near the Queensferry, in the Firth of Forth. One much larger had been seen some time before, but escaped. I purchased it for dissection, although I was aware that it was impossible for me, during the hurry of the winter session, to devote much time to it. But I had able assistants (Mr. Henry Goodsir, Mr. Edward Forbes, and my brother), from whom I expected a good deal of aid. Some very beautiful drawings of this whale, made for me by Mr. Edward Forbes and by my brother, are still in my possession.

It was easy to see, by the dorsal fin and by the numerous plaits or folds on the abdominal surface of the throat and chest, before any dissection, that the specimen was a young Balænopterus whale, differing in a great many points from the true whale or *Mysticetus*: for, 1st, the form of the head was entirely different; 2nd, it had a dorsal fin; and, 3rd, occupying the lower surface of the throat and thorax were numerous folds of the integuments. To this class of whales I have been in the habit of giving the name of Rorqual, to distinguish them from the other class of Whalebone Whales, the *Mysticetus* both *borealis* and *australis*.

It appears from my notes, that at that time M. G. Cuvier considered the species I now describe as identical with the Great Rorqual I had described about two years previously; but I felt convinced then, as now, that they form distinct species, and in this opinion some continental anatomists seem to coincide.

Being persuaded that there was some inaccuracy in former drawings of the species, I had the specimen suspended and drawn with great care by Mr. Edward Forbes. This position explained the mechanism of the mouth, showing its great size, even in the short Balæna Whales; its great capacity in the *Mysticetus* had never been doubted.

As to the species, the conclusion I arrived at was, that the specimen belonged to that termed by Fabricius *rostrata*, and that individuals of the species had been seen by John Hunter, Sir James Watson, and Fabricius.

<i>Measurements.</i>		ft. in.
Total length of the specimen.....		9 11
Circumference immediately behind the pectoral extremities	5 2	
Circumference where the folds or rugæ terminated	4 8½	
Ditto of the tail at its origin.....	1 5½	
Length from the back fin to the setting on of the tail	2 10	
„ from the snout to the ear.....	3 0	
„ from snout to nostrils	1 4	
„ of lower jaw	2 3	
„ of arm; inner side.....	1 3	
„ from the angle of the mouth to the arm..	1 3	
„ from snout to arm.....	2 9	
„ of tail in depth	0 11	
„ of back fin at the base	0 8	
Height of back fin	0 8½	
From top to tip of tail	2 8½	
Stomach:—1st compartment, in length	1 2	
2nd „ „	1 4	
3rd „ „	0 8	
4th „ „	0 7	
5th „ „	0 3	
Spleen weighed 4 ounces; its length was	0 5	
Liver, 9 lbs.		
Small intestines, length	20 0	

	ft.	in.
Large „ „	2	4
Kidney, weight $2\frac{1}{4}$ lbs.		
Brain (including 2 inches of spinal marrow), $3\frac{1}{2}$ lbs.		
Cerebellum, pons, and 2 inches of spinal marrow, $\frac{3}{4}$ lb.		
Great hemisphere of the brain measured 8 inches in length, in breadth, $6\frac{1}{2}$; at the base, 8 inches.		
Tuber annulare	0	$1\frac{3}{4}$
Olfactory nerves, in length	0	$1\frac{1}{2}$
Ditto, breadth.	0	$2\frac{1}{2}$
Skeleton :—Length of cranium.	2	11
Greatest breadth between the orbits .	1	8
Length of vertebral column	7	8

When we compare the skeleton of this Rorqual with the Gigantic Rorqual I also dissected, we find as follows:—

	<i>R. giganteus.</i>	<i>R. minor.</i>
Cervical vertebrae 7	vertebrae 7	
Dorsal 15	11	
Lumbar, sacral, caudal 43	30	
	<hr/> 65	<hr/> 48

These differences must be specific.

At the extremity of the snout in either jaw there were 8 strong bristles, being the only vestiges of hair found on the external surface. The mouth was of great size; the tongue large and tolerably free, and of a pale rose or vermilion colour. The baleen, where deepest, measured about 4 inches; there were 370 plates on each side; but anteriorly and posteriorly these plates were reduced to mere bristles.

The isthmus faucium allowed the closed hand to pass through it; through this isthmus I do not believe that any water ever passes into the pharynx, unless it be accidentally, as in man. The “spout” of the Whalebone Whale is composed, no doubt, of the pulmonary vapour, and not of any water received into the pharynx from the mouth.

The stomach seemed composed of five compartments externally, but presented only four when laid open, the fifth being manifestly the duodenum. In the intestines no remains of food were found, but abundance of intestinal worms, and a substance strongly resembling the human meconium. There was an ilio-cæcal valve as

distinct as in man. In the rectum the folds of the mucous membrane were transverse.

Organs of Respiration.—The external nostrils were double; and the cavities of the nostrils provided with the remarkable cartilages and muscular apparatus I discovered and described in the anatomy of the Great Rorqual. In this specimen they were about 4 inches in length, but of as many feet in the large Rorqual. The mode of breathing in the Rorquals does not differ much from that in man, with the exception of the apparatus of the protruding cartilages, which in man are rudimentary.

The *Olfactory Nerves* were quite as large as in other mammals; and in this respect the Balæna Whales are quite unlike the Dolphins*.

The trachea communicated, near its upper part, with a sac or pouch; the lungs were each composed of a single lobe. The rings of the trachea were mostly deficient anteriorly. In the heart the foetal arrangements had wholly disappeared. The dura mater seemed divisible into three layers, the external being vascular. A remarkable vascular substance connected with this layer covers the back part of the brain and cerebellum, extending into the spinal canal, and even into the chest. At the base of the brain the vascular plexus was about 2 inches in thickness. It is, as is well known, a sort of erectile tissue, of whose functions we are wholly ignorant. It is not confined to this course, but extends to the neck, and, passing through the foramina intervertebralia, fills the intercostal spaces exterior to the pleura.

There was evidently a canal in the centre of the spinal marrow. Wherever the nerves of the lungs and stomach were traced, they terminated in loops. We did not observe in the Great Rorqual any tracheal pouch like that in the smaller; but it may have escaped notice: if absent in the Great Rorqual, it would be another proof of the distinctness of the species.

The doubts raised by M. St. Hilaire, as to the Whale being a mammal in the true sense of the term, were set aside long ago by an appeal to facts. The young of the Whale tribe suckle like the young of all mammals; nevertheless I showed, in 1834, that

* In his paper "On the Structure of Whales" (Phil. Trans. 1787), Hunter remarks that the organ of smell "is peculiar to the large and small Whalebone Whales." He further remarks, that, "in those that have olfactory nerves, the lateral ventricles are not continued into them as in many quadrupeds;" and he notices "the want of the olfactory nerves in the genus of the Porpoise."—'Anim. Economy,' Palmer's edit. pp. 372, 373, 376.

the lactiferous glands in the *Balaenoptera* differ in structure from the same organs in most mammals.

I do not find in my notes anything to add to the description of the Great Rorqual already published in the 'Transactions of the Royal Society of Edinburgh' for 1827, to which I beg leave to refer the reader.

A single remark must be added regarding the nature of the vascular plexus which, in the Cetacea, surrounds the spinal marrow, and extends into the chest. On selecting the artery which seemed to form the plexus, which was, if I rightly recollect, in this instance an intercostal artery, and dissecting it under water, I found, to my surprise, that the artery, so long as I followed it, never gave off any branches, but continued of the same calibre throughout, making innumerable flexuosities or turnings. Thus, on a plexiform mass of this kind being cut across, the first impression is, that a great number of arterial branches or arteries have been divided, whilst in fact the entire plexus seems to be formed of one artery.

As was to be expected of animals so much withdrawn from human observation, there is but little to say on the natural history of the Cetacea properly so called. Their food, no doubt, is various, and seems to have little or no relation to the character of their dentition. The enormous Cachalot, with its vast teeth implanted only in one jaw, is generally understood to prey chiefly on the Cuttlefish. The food of the true Whale, or *Mysticetus*, is well known to be the Clio and other smaller Mollusca, with which certain regions of the ocean abound; the same, or similar, is probably the food of the more active and restless Rorquals, found in both hemispheres. The Dolphins, or Toothed Whales, generally prey, no doubt, on fishes of various kinds; yet, even as regards these, it has been proved by my esteemed friend, the late Mr. Henry Goodsir, that some of the largest, following in the wake of the herring shoals, prey not on these, but on the various microscopic food (the Entomostraca and other marine animals) which I was the first to prove to be the natural food of many excellent gregarious freshwater fish, as the Vendace, Early Loch Leven Trout, the Brown Trout of the Highland and Scottish lakes generally, and of the Herring itself*. It is scarcely necessary to add, that the complex apparatus connected with the exterior

* See Memoirs in the 'Transactions of the Royal Society of Edinburgh' for 1832.

nostrils of the Dolphins is wholly wanting in the Balæna Whales,—a fact of which M. Cuvier was not aware when he wrote his celebrated Treatise on Comparative Anatomy.

Appendix.—Since writing the above, I have received an answer to a letter I addressed to my friend, John Goodsir, Esq., Professor of Anatomy in the University of Edinburgh. The request contained in my letter to Mr. Goodsir was, to examine for me the skeleton of a foetal *Mysticetus* now in the University Museum. The foetus from which this skeleton was prepared was removed from the uterus of the mother, killed in the North Seas by the seamen of a whaling ship, by one of my former students, Mr. R. Auld, who presented the specimen to me. The point at issue was the composition of the cervical vertebræ in the true or Greenland Whale, the *Balæna Mysticetus*. M. Van Beneden, to whose memoir I have referred in the commencement of this, says, on the authority of Eschricht, that at no age whatever do we find in true Whales (meaning, I presume, the *Mysticetus borealis* and *australis*) any distinct vertebræ in the cervical region, as in other mammals. A fusion of all into one bone or cartilage seems to take place even in the youngest foetus. Now, I had enjoyed the rare opportunity of dissecting the foetus of the *Mysticetus*, and I knew that the skeleton, prepared with the greatest care, was still preserved in the Museum of the University of Edinburgh. I wrote to Mr. Goodsir to re-examine this point for me, for I did not find in my notes any confirmation of the observations of Eschricht. Mr. Goodsir's reply to my note is as follows:—

“ University, Edinburgh,
Sept. 30, 1857.

“ MY DEAR SIR,

“ In the skeleton of the foetal *Mysticetus* now in the University Museum, the bodies of the axis and atlas have shrivelled up together, having evidently consisted of cartilage only; but the bodies of the five posterior cervical vertebræ are beautifully distinct, having well-formed osseous centres, which give them more of the configuration of the succeeding vertebral bodies than they present in their compressed form in the adult.

“ The neural arches in the cervical region of this skeleton are five in number; the two anterior, which are distinctly those of the atlas and axis, have an osseous nodule on each side, where the transverse processes pass off. The third arch belongs to the third vertebra, the fourth and fifth to the sixth and seventh. These three arches are cartilaginous, and present no osseous centres. It

is impossible to determine from the preparation whether the arches of the fourth and fifth vertebræ had been cut away in dissecting the parts, or whether they have shrivelled up in drying; but as the skeleton was very carefully prepared, and as these two arches are deficient (at least laterally) in the adult *Mysticetus*, I presume that the cartilaginous matrices were at least extremely delicate in the fœtus.

"I believe I have stated all the facts, afforded by this skeleton, which bear upon your questions. They appear to me to afford no support to the views to which they refer.

"Yours very sincerely,
(Signed) "JOHN GOODSIR."

The conclusion I arrived at is this,—that the actual number of cervical vertebræ in the *Mysticetus* is, as in most other mammals, seven, and that, notwithstanding their earlier fusion, they are originally quite distinct.

Extract of a Letter from Dr. BAIKIE to Sir JOHN RICHARDSON,
M.D., C.B., F.R. & L.S., dated 29th October, 1857, Rabba,
on the Qworra.

[Read January 21st, 1858.]

"In natural history my collection is advancing, especially in skins and skeletons of birds. I am collecting skulls of all the domesticated animals, and skeletons of the sheep and goats. I have got a few fish, including a prettily-marked *Diodon* or *Tetraodon*, probably new, and a *Mylietes* which I did not meet with formerly. The *Siluridae* are the most abundant fishes; and one species closely resembles the *Hypophthalmus*, figured by Rüppell in his 'Fishes of the Nile and Red Sea.' I have not met with another *Polypterus*. I shall get a *Lepidosiren* in the river, and have heard of an electrical fish, I believe a *Malopteruris*, such as I formerly found. I enclose two scales of a fish which is said to grow to the length of 5 feet, but of which I have specimens half that size only,—also a sketch of a curious fish 2½ feet, which I put into spirits; it has neither ventral nor anal fins, a very peculiar caudal, and a slender head, while the dorsal extends along the whole back; eyes very small; teeth numerous and hard, but not sharp." He adds, in a postscript, that he had got the *Lepidosiren*. He had collected

700 species of plants, and numerous fine fruits, which he says "will rejoice Sir William Hooker's heart."

Dr. Baikie's postscript, however, mentions that his vessel had been wrecked about twelve miles above Lagos, and that she sunk in a few minutes after she struck. He does not say what was the fate of his collections, but states that all the party had fever from fatigue and sleeping in swamps after the wreck.—J. R.

Catalogue of the Dipterous Insects collected in the Aru Islands
by Mr. A. R. WALLACE, with Descriptions of New Species.
By FRANCIS WALKER.

ARU ISLAND.

Fam. MYCETOPHILIDÆ, *Haliday*.

Gen. SCIARA, *Meigen*.

Div. A. a., *Meig.* vi. 305.

1. SCIARA SELECTA, n. s. *Mas.* Nigra, cinereo-tomentosa, antennis sat validis, pedibus piceis, alis cinereis, venis costalibus crassis.

Male. Black, with cinereous tomentum; antennæ rather stout; legs piceous; wings greyish; veins black; radial and cubital veins thick; radial vein extending to the fork of the subapical. Length of the body $1\frac{1}{2}$ line; of the wings 4 lines.

Fam. BIBIONIDÆ, *Haliday*.

Gen. PLECIA, *Hoffmansegg*.

2. *Plecia dorsalis*, *Walk.* See Vol. I. p. 5.

Fam. CULICIDÆ, *Haliday*.

3. CULEX SCUTELLARIS, n. s. *Mas.* Nigro-fuscus, capite thoraceque argenteo trivittatis, scutello rufescente; abdominis segmentis argenteo fasciatis, genubus et tarsorum posticorum fasciis niveis; alis subcinereis, venis nigris ciliatis.

Male. Blackish brown. Head and thorax with three silvery stripes, the middle one very distinct; scutellum reddish; pectus with silvery gloss; abdomen with silvery bands, which are narrow above, broad beneath; femora pale towards the base; knees snow-white; hind tarsi with 5 broad snow-white bands; middle tarsi with the first and second joints white at the base; wings slightly greyish; veins black, fringed. Length of the body 3 lines; of the wings 5 lines.

Fam. TIPULIDÆ.

Gen. MEGISTOCERA, *Wied.*

4. *Megistocera tuscana*, *Wied. Auss. Zweifl.* 1. 55. 1.
Inhabits also Java.

Gen. GYNOPLISTIA, *Westw.*

5. *GYNOPLISTIA JURGIOSA*, n. s. *Mas. et Fem.* Nigra, capite rufescente, alis cinereis, plagis costalibus nigro-fuscis.—*Mas.* Abdomine ochraceo, apice nigro, femoribus basi testaceis.—*Fem.* Abdomine atro fasciis albidis apice luteo.

Male and Female. Black. Head reddish; antennæ testaceous at the base; thorax testaceous in front; wings greyish, blackish-brown along the costa, and with three subcostal blackish-brown patches, the third continued along the veins towards the hind border. *Male.* Abdomen ochraceous, black at the tip; femora testaceous at the base; halteres testaceous. *Female.* Abdomen deep black, with whitish bands on the sutures; tip luteous. Length of the body 5-6 lines; of the wings 9-10 lines.

Fam. STRATIOMIDÆ, *Haliday.*Gen. PTILOCEBA, *Wied.*

6. *Ptilocera quadridentata.* See Vol. I. p. 7.
7. *MASSICYTA INFLATA*, n. s. *Fem.* Nigra, capite viridi maculis nigris, antennis basi ferrugineis, pectoris callis duobus scutelloque testaceis, abdomine basi sordide albido lineis tribus nigris, fasciis duabus canotomentosis, segmentis tertio quartoque apice ferrugineis, tibiis basi tarsisque albidis, alis subcinereis fusco marginatis, stigmate nigricante, halteribus testaceis.
- Female.* Black. Head dull green, with several black spots; mouth testaceous; antennæ dark ferruginous towards the base; two pectoral calli and the scutellum testaceous; abdomen at the base dingy-whitish and semihyaline, and with three black lines; third and fourth segments with hoary bands, their hind borders ferruginous; tibiæ towards the base, and tarsi, whitish; hind tibiæ with the two colours most distinctly marked; wings grey, with broad brownish borders; stigma blackish; veins black; halteres testaceous. Length of the body 6 lines; of the wings 11 lines.
8. *MASSICYTA CERIOIDES*, n. s. *Fem.* Nigra, capite testaceo maculis nigris, antennis basi ferrugineis, pectoris callis duobus, thoracis vittis duabus interruptis, scutello abdominisque fasciis tribus viridibus, segmento abdominali secundo maculis duabus testaceis, tarsis albis, alis nigricanti-fuscis, halteribus viridibus.

Female. Black. Head testaceous, with some black spots on the vertex. Antennæ dark ferruginous towards the base. An interrupted stripe on each side of the thorax, two pectoral calli, the scutellum, and the hind borders of the second, third, and fourth abdominal segments green. Abdomen testaceous at the base beneath; first band interrupted, having before it two testaceous spots. Knees lurid; tarsi white. Wings blackish brown; stigma and veins black; halteres apple-green. Length of the body 5-6 lines; of the wings 10-12 lines.

Gen. SALDUBA, n. g.

Male. *Corpus* angustum, sublineare. *Caput* transversum; vertex angustus. *Oculi* magni. *Antennæ* capite transverso valde longiores; articuli primo ad septimum breves; flagellum longum, lanceolatum, subarcuatum. *Thorax* longus, subcompressus; scutellum inerme. *Abdomen* planum, thorace paullo longius. *Pedes* graciles; postici longi. *Alæ* angustæ.

Male. Body narrow, nearly linear. Head slightly transverse, nearly as broad as the thorax; vertex narrow. Eyes large. Antennæ shorter than the thorax; joints from the first to the seventh short; flagellum long, lanceolate, slightly curved. Thorax long, slightly increasing in breadth from the head to the base of the wings. Abdomen nearly flat and linear, a little longer than the thorax. Legs slender; hind pair long. Wings narrow; veins complete, distinctly marked; first cubital areolet rather short, divided from the second by the oblique first cubital rim; discal areolet large, hexagonal; subanal and anal veins united at some distance from the border.

9. SALDUBA DIPHYSOIDES, n. s., *Mas. Nigra*, ore flavo, thorace vittis quatuor subauratis, abdominis apice cinereo, pedibus albidis, femoribus posticis apices versus tibiisque posticis nigris, alis cinereis, venis stigmatæque nigris, halteribus testaceis.

Male. Black. Mouth yellow; thorax with four stripes of slightly gilded tomentum; tip of the abdomen with cinereous tomentum; legs whitish, hind femora towards the tips and hind tibiæ black; wings greyish, veins and stigma black; halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Gen. STRATIOMYS.

10. STRATIOMYS CONFERTISSIMA, n. s. *Fæm. Nigra*, subtus ferruginea, capite fulvo, antennis basi fulvis, thorace vittis quatuor subauratis, scutelli margine fulvo, ventre piceo basi testaceo, pedibus fulvis nigro fasciatis; alis subcinereis, venis stigmatæque nigris, halteribus testaceis.

Female. Black, ferruginous beneath. Head, antennæ at the base, border of the scutellum, and legs tawny; antennæ a little shorter than the breadth of the head; thorax with four slightly gilded

stripes; abdomen beneath piceous, testaceous at the base; femora and tibiæ with broad black bands; wings greyish, stigma and veins black; halteres testaceous. Length of the body 4 lines; of the wings $7\frac{1}{2}$ lines.

11. *STRATIOMYS NEXURA*, n. s. *Mas et Fem.* Nigra, antennis basi fulvis, capite transverso brevioribus, abdominis lateribus, ventre, tibiis, tarsis halteribusque fulvis, alis limpidis, venis testaceis. *Mas.* Thorace atro piloso. *Fem.* Thorace nigro-seneo angustiore.

Male and female. Black. Head rather prominent; antennæ tawny towards the base, shorter than the breadth of the head; spines of the scutellum, abdomen beneath, tibiæ, tarsi, and halteres tawny; wings limpid, veins testaceous. *Male.* Thorax deep black, pilose; abdomen tawny along each side. *Female.* Head shining; thorax seneous black, narrower than that of the male; abdomen with the tawny stripes much narrower than those of the male. Length of the body $3\frac{1}{2}$ lines; of the wings $6\frac{1}{2}$ lines.

Gen. *CLITELLARIA*, *Meigen*.

12. *Clitellaria bivittata*, *Fabr.* See Vol. I. p. 7.

Gen. *GABAZA*, n. g.

Fem. *Corpus* breve, latum. *Caput* transversum, thorace paullo angustius; facies valde obliqua. *Antennæ* capite transverso breviores; articuli breves, transversi; arista longa, gracilis, filiformis. *Scutellum* prominens, spinis duabus minutis. *Abdomen* transversum, thorace multo latius. *Pedes* graciles, breviusculi. *Alæ* sat angustæ; venæ tenues.

Female. Body short, broad. Head transverse, a little narrower than the thorax; face very oblique. Antennæ shorter than the breadth of the head; joints short, transverse; arista slender, filiform, longer than the preceding part, which is lanceolate. Scutellum prominent, armed with two minute spines. Abdomen transverse, much broader than the thorax. Legs slender, somewhat short. Wings rather narrow; veins feeble, in structure like those of *Stratiomys*.

13. *GABAZA ARGENTEA*, n. s. *Fem.* Nigra, antennis fulvis, arista alba, thorace abdomineque argenteo-tomentosis, tarsis albido-testaceis, alis limpidis, venis pallidis.

Female. Coal-black. Antennæ tawny, arista white; thorax and abdomen with bright silvery tomentum; tarsi whitish testaceous; wings limpid, veins pale. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

Gen. *SARGUS*, *Fabr.*

14. *Sargus metallinus*, *Fabr.* See Vol. I. p. 110.

15. *SARGUS COMPLENS*, n. s. *Fam.* Rufescens-fulvus, capitis vertice nigro, antennis testaceis, abdomine fasciis latis abbreviatis piceis, tarsis posticis basi tibiisque posticis nigris, alis cinereis, basi sub-luridis, apud costam anteriorem nigro-fuscis.

Female. Reddish tawny. Head black above, testaceous beneath; antennæ testaceous; abdomen with four broad abbreviated piceous bands; legs tawny, hind tibiæ black with a tawny apical mark, hind tarsi black towards the base; wings greyish, slightly lurid towards the base, blackish-brown about the exterior part of the costa, veins black, tawny towards the base; halteres testaceous, tawny towards the tips. Length of the body 6 lines; of the wings 14 lines.

16. *SARGUS ROGANS*, n. s. *Mas et Fem.* Capitis vertice nigro, antennis pedibusque testaceis, tibiis tarsisque posticis nigris, alis sub-cinereis apice obscurioribus. *Mas.* Luteo-testaceus. *Fem.* Ferrugineus.

Male and Female. Head black above; antennæ and legs testaceous; hind tibiæ and hind tarsi black; wings greyish, darker towards their tips; veins black, tawny towards the base. *Male.* Lutescent testaceous. *Female.* Ferruginous; wings darker than those of the male. Length of the body 5 lines; of the wings 10 lines.

Gen. *NERUA*, n. g.

Fem. *Corpus* longiusculum, sublineare. *Caput* transversum, thorace non latius. *Antennæ* breves; articulus tertius rotundus; arista apicalis, longa, tenuis, setiformis. *Thorax* productus. *Scutellum* spinis quatuor longiusculis. *Abdomen* depressum, sublineare, thorace vix latius, non longius. *Pedes* graciles, non longi. *Alæ* angustæ; venæ bene determinatæ.

Female. Body rather long, nearly linear. Head transverse, not broader than the thorax. Antennæ short; third joint round; arista apical, long, slender, setiform. Thorax long. Abdomen flat, thin, nearly linear, hardly broader and not longer than the thorax. Legs slender, not long. Wings narrow; veins distinctly marked, in structure like those of *Cistellaria*.

This genus may be distinguished from *Culcua* by the shape of the abdomen.

17. *NERUA SCENOPINOÏDES*, n. s. *Fem.* Atra, nitens, antennis fulvis, scutelli spinis pedibusque albis, alis nigrocinereis, postice pallidioribus, venis nigris, halteribus testaceis.

Female. Coal-black, shining; antennæ tawny; thorax slightly tomentose; spines of the scutellum and legs white; wings blackish grey, paler towards the hind border, veins black; halteres testaceous. Length of the body 3 lines; of the wings 5 lines.

Gen. ADRAGA, n. g.

Mas. Corpus sublineare. *Caput* thorace non latius. *Oculi* connexi. *Antennæ* brevissimæ; articulus tertius rotundus; arista apicalis, gracilis, setiformis. *Thorax* sutura transversa bene determinata. *Scutellum* prominens, trigonum, marginatum. *Abdomen* thorace paullo brevius, non latius. *Pedes* breviusculi, validi, non dilatati. *Alæ* mediocres.

Male. Body nearly linear, rather thick. Head not broader than the thorax. Eyes connected. *Antennæ* very short; third joint round; arista apical, long, slender, setiform. Thorax with the transverse suture very distinct. Scutellum prominent, triangular, with a border. Abdomen a little shorter and not broader than the thorax. Legs stout, rather short, not dilated. Wings moderately broad; veins in structure like those of *Clitellaria*.

18. ADRAGA UNIVITTA, n. s. *Mas.* Nigra, subtilissime punctata, antennis piceis, thorace vitta cinerea, tarsis posterioribus albis, alis nigricantibus.

Male. Coal-black, hardly shining; *antennæ* piceous; thorax and abdomen very minutely punctured; thorax with a stripe of cinereous tomentum; posterior tarsi white; wings blackish, veins black. Length of the body 3 lines; of the wings 5 lines.

Gen. OBRAPA, n. g.

Fam. Corpus breve, latum, crassum, convexum. *Caput* transversum, thorace angustius. *Antennæ* breves; articulus tertius rotundus; arista apicalis, gracilis, setiformis. *Thorax* sutura transversa bene determinata. *Abdomen* transversum, thorace paullo latius, valde brevius. *Pedes* breviusculi, validi; antici subdilatati. *Alæ* mediocres.

Female. Body short, broad, thick, convex. Head transverse, narrower than the thorax. *Antennæ* short; third joint round; arista apical, slender, setiform. Thorax with the transverse suture very distinct. Scutellum large, prominent, with a marginal suture. Abdomen transverse, a little broader than the thorax, and not more than half its length. Legs stout, rather short, the fore pair slightly dilated. Wings moderately broad, veins rather irregular; discal areolet large, quadrilateral; externomedial veins, subanal vein, and anal vein very slight; subanal vein and anal vein united at some distance from the border.

19. OBRAPA PERILAMPOIDES, n. s. *Fam.* Atra, nitens, subtilissime punctata, capite glabro, antennis piceis, tarsis posterioribus albidis, alis limpidis, venis albidis basi nigris, halteribus niveis.

Female. Deep black, shining, very minutely punctured; head smooth; *antennæ* piceous; posterior tarsi whitish, with black tips; wings limpid, veins whitish, black towards the base; halteres snow-white. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

20. *OBRAPA CELYPHOIDES*, n. s. *Fam.* Atræ, nitens, subtilissime punctata, capite glabro, antennis piceis, tarsis albidis, alis nigro-cinereis, venis nigris, halteribus niveis.

Female. Deep black, very minutely punctured. Head smooth; antennæ piceous; tarsi whitish; wings blackish cinereous, veins black; halteres snow-white. Length of the body 2 lines; of the wings 4 lines.

Fam. TABANIDÆ, Leach.

Gen. TABANUS, Linn.

21. *TABANUS RECUSANS*, n. s. *Fam.* Piceus, cinereo-subtomentosus, collo nigro angusto, antennis rufis apice nigris, humeris rufescentibus, abdomine basi glaucescente, tibiis obscure ferrugineis, alis nigro-fuscis, apice margineque postico cinereis.

Female. Piceous, slightly covered with cinereous tomentum. Callus of the head black, long, slender, entire; antennæ red, black towards the tips, angle of the third joint very small; thorax reddish on each side in front of the forewings; abdomen with glaucous tomentum towards the base; tibiæ mostly dark ferruginous; wings blackish-brown, cinereous towards the tips and along the hind border; veins black; forebranch of the cubital vein simple, very slightly undulating, its tip, like that of the radial vein, clouded with blackish-brown. Length of the body 6½ lines; of the wings 12 lines.

Fam. ASILIDÆ, Leach.

Subfam. DASYPOGONITES, Walk.

Gen. DASYPOGON, Fabr.

22. *DASYPOGON INOPINUS*, n. s. *Fam.* Piceus, facie aurata, mystace parvo albo, antennis ferrugineis, apices versus nigris, capite transverso longioribus, articulo tertio lineari, pectore fasciis tribus canis, abdominis segmentis ferrugineo fasciatis, alis luridis, apud costam nigro-fuscis, halteribus testaceis.

Female. Piceous. Face flat, brightly gilded; epistoma not prominent; mystax with a few white bristles; mouth black; antennæ ferruginous, black towards the tips, longer than the breadth of the head; third joint linear, longer than the first and the second together; pectus with three hoary bands; abdomen subclavate, nearly twice the length of the thorax; a ferruginous band on the hind border of each segment; legs mostly ferruginous; wings lurid, blackish-brown towards the costa, veins black; halteres testaceous. Length of the body 8 lines; of the wings 14 lines.

23. *DASYPOGON HONESTUS*, n. s. Lutescente-fulvus, capite, antennis, pedibus alisque nigris, thorace vitta schistacea nigro marginata vit-

tisque duabus lateralibus cinereis, pectore postico nigro, abdomine —?, tibiis tarsisque posticis fulvis.

Luteous-tawny. Head, antennæ, hind part of the pectus, and legs black, shining; mystax with very few bristles; antennæ almost as long as the breadth of the head, third joint long, slender, linear; thorax with a slate-coloured blackish-bordered stripe, a short slate-coloured stripe on each side; abdomen wanting; hind tibiæ and tarsi tawny; wings blackish, veins black. Length of the body 4? lines; of the wings 7 lines.

Subfam. LAPHRITES, *Walk.*

Gen. LAPHRIA, *Fabr.*

24. *Laphria scapularis*, *Wied. Auss. Zweifl.* 1. 516. 29.

Inhabits also Java.

25. *Laphria aurifacies*, *Macq.* See Vol. I. p. 10.

26. *LAPHRIA GLORIOSA*, n. s. *Mas et Fæm.* Aurata, capite pectoreque albis, abdomine purpureo, guttis lateralibus albis, basi viridi, lateribus pedibusque cyaneis, alis fuscis basi cinereis, halteribus testaceis.

Male and Female. Head and pectus with white tomentum and hairs; mystax with a few black bristles; mouth and antennæ black; third joint of the latter linear, conical at the tip, longer than the first and the second together; thorax with cupreous-gilded tomentum; abdomen purple, green at the base, blue and with a row of white dots along each side; legs blue; wings brown, cinereous towards the base, veins black; halteres testaceous. *Male.* Legs very thick and pilose. Length of the body 9 lines; of the wings 16 lines.

27. *LAPHRIA SOCIA*, n. s. *Fæm.* Cyaneo-viridis, capite aurato, antennarum articulo tertio longissimo subfusiformi, thoracis tomento subaurato, vitta media nuda, pectore argenteo, abdomine purpureo-cyaneo basi viridi maculis lateralibus argenteis, alis nigro-cinereis basi cinereis.

Female. Bluish-green. Head brightly gilded, hind part silvery; mystax with six long black bristles; third joint of the antennæ very elongate subfusiform; thorax with slightly gilded tomentum, excepting a broad bare middle stripe; pectus with silvery tomentum; abdomen purplish-blue, green towards the base, with spots of silvery tomentum along each side; hind borders of the ventral segments white; wings grey, blackish-grey for almost half the length from the tips and along three-fourths of the length of the hind border, veins black; halteres ferruginous. Length of the body $8\frac{1}{2}$ lines; of the wings 16 lines.

28. *LAPHRIA CONSOBRINA*, n. s. *Fæm.* Purpurea, capite aurato, pectore argenteo, abdomine viridi-cyaneo, maculis lateralibus argenteis, alis nigricantibus basi cinereis.

Female. Purple. Head brightly gilded, hind part silvery, underside with white hairs; mystax with six long black bristles; pectus with silvery tomentum; abdomen greenish blue, with spots of silvery tomentum along each side; hind borders of the ventral segments white; wings slightly grey, blackish for full half the length from the tips and along full three-fourths of the length of the hind border, veins black; halteres ferruginous, with black tips. Length of the body $7\frac{1}{2}$ lines; of the wings 14 lines.

This species much resembles *L. socia*, but may be distinguished by the difference of colour, and more especially by the more undulating first branch vein, by the much less oblique third externo-medial vein, and by the subanal vein, which is united to the anal vein much nearer the border.

29. *LAPHRIA SODALIS*, n. s. *Mas.* Cyanea, capite aurato, antennarum articulo tertio fusiformi, thoracis lateribus purpureo-viridibus, pectore ventrique argenteis, abdomine maculis lateralibus argenteis, alis cinereis, apice posticeoque nigricantibus,

Male. Blue. Head brightly gilded, vertex and hind part silvery, underside with white hairs; mystax with four long black bristles, and with several gilded bristles; third joint of the antennæ elongate-fusiform; sides of the thorax varied with green and purple; abdomen with spots of silvery tomentum along each side, underside and pectus silvery; wings grey, black towards the tips and along half the length of the hind border; halteres white. Length of the body 7 lines; of the wings 13 lines.

The veins of this species are hardly different from those of *L. consobrina* in structure, excepting the third externo-medial, which is united to the fourth nearer the border.

30. *LAPHRIA COMES*, n. s. *Mas et Fem.* Viridi-cyanea, capite aurato, antennarum articulo tertio fusiformi, pectore ventrisque lateribus argenteis, abdomine viridi (mas) aut purpureo-cyaneo (fem.) maculis lateralibus argenteis, alis nigricantibus basi cinereis.

Male and Female. Greenish blue. Head brightly gilded, hind part silvery; mystax with six long black bristles; third joint of the antennæ elongate-fusiform; pectus with silvery tomentum; abdomen green in the male, purplish-blue in the female, with silvery spots along each side, underside with two silvery stripes; wings blackish, grey at the base and along the costa for more than one-third of the length, veins and halteres black. Length of the body 6–6½ lines; of the wings 11–12 lines.

This may be only a small variety of *L. consobrina*; but the wings are not darker towards the costa as in that species, and the first branch-vein is much more straight.

31. *LAPHRIA CONSORS*, n. s. *Mas et Fem.* Viridis (mas) aut cyanea (fem.), capite aurato, antennarum articulo tertio brevifusiformi, pectore

argenteo, abdomine aeneo-viridi (mas) aut cyaneo-purpureo (fœm.) maculis lateralibus argenteis, alis nigricantibus, basi cinereis.

Male and Female. Green (male) or blue (female). Head gilded, hind part silvery; mystax with a few black bristles; third joint of the antennæ short-fusiform; pectus silvery; abdomen aeneous-green in the male, bluish-purple in the female, with silvery spots along each side; wings blackish, grey at the base and along the costa for more than one-third of the length; veins and halteres black. Length of the body $4\frac{1}{2}$ –5 lines; of the wings 8–9 lines.

The straight and not oblique third externo-medial vein distinguishes this species from all the preceding *Laphrie*.

32. *LAPHRIA GERMANA*, n. s. *Fœm.* Cyanea, facie aurata, antennarum articulo tertio longissime subfusiformi, abdominis maculis lateralibus pectoreque argenteis, alis cinereis, basi subcinereis, halteribus albis.

Female. Blue. Head gilded in front, vertex and hind part silvery; mystax with six black bristles; third joint of the antennæ very long, subfusiform; pectus silvery; abdomen purplish blue, shorter than in the preceding species, with silvery spots along each side; wings grey, slightly grey towards the base; halteres white. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

33. *LAPHRIA FLAGRANTISSIMA*, n. s. *Mas.* Rufescente-cervina, capite aurato, antennis pedibusque rufescentibus, thorace vittis tribus latissimis (lateralibus abbreviatis) pectoreque nigricantibus, alis lutescentibus, plaga postica interiore fasciaque latissima exteriori nigricantibus.

Male. Reddish fawn colour. Head gilded; mystax with numerous gilded bristles; mouth lanceolate, very stout; antennæ reddish, third joint long, lanceolate, abruptly acuminate at the tip; thorax with three very broad blackish stripes; disk of the pectus black; abdomen with the segments darker towards the base, underside black towards the tip; legs reddish, stout; tarsi with black bands beneath; wings somewhat luteous, with a large blackish patch on the hind border near the base, and with a very broad blackish band near the tip; halteres testaceous. Length of the body 11 lines; of the wings 22 lines.

34. *LAPHRIA JUSTA*, n. s. *Mas.* Lutea, capite aurato, ore, antennis apice, thoracis maculis duabus posticis, pectore, abdominis fasciis latissimis femoribusque nigris, alis cinereis, apud costam luridis.

Male. Luteous. Head gilded; mystax with numerous gilded bristles; mouth short, black; antennæ reddish tawny, third joint lanceolate, black except at the base; thorax with the disk somewhat darker, two large black spots hindward; pectus black; abdomen linear, with a broad black band on the fore border of each segment; femora black above except at the tips, hind femora black also beneath; wings

greyish, slightly clouded with dark grey, lurid along the costa for three-fourths of the length; halteres testaceous. Length of the body 8 lines; of the wings 14 lines.

35. *LAPHRIA MANIFESTA*, n. s. *Mas et Fœm.* Fulva, capite argenteo (mas) aut pallide aurato (fœm.), antennis apice nigris, thoracis disco et abdominis maculis subtrigonis subæneo-ferrugineis, scutello quadrisetosus, alis subcinereis.

Male and Female. Tawny. Head silvery in the male, pale-gilded in the female; mystax with several slender bristles; mouth lanceolate; third joint of the antennæ very elongate-subfusiform, black towards the tip; disk of the thorax and nearly triangular dorsal spots of the abdomen ferruginous with a slight æneous tinge; pectus testaceous, slightly silvery; wings slightly greyish; veins black, testaceous at the base, where the wings also have a testaceous tinge; halteres testaceous. Length of the body 4½–5 lines; of the wings 8–9 lines.

36. *LAPHRIA APERTA*, n. s. *Fœm.* Testacea, capite subargenteo, antennis abdominisque apice nigris, alis nigricantibus basi limpidis, halteribus albidis.

Female. Testaceous. Head with whitish slightly silvery tomentum; mystax with very few bristles; antennæ black, third joint long, linear, conical at the tip; thorax with a very indistinct darker stripe; abdomen black towards the tip; wings blackish, limpid towards the base; veins black, testaceous at the base; halteres whitish. Length of the body 4 lines; of the wings 7 lines.

37. *LAPHRIA DECLARATA*, n. s. *Mas.* Fulva, capite albo, facie argentea micante, antennis tibiisque posticis nigris, thorace atro, alis cinereis, venis nigris, halteribus testaceis.

Male. Tawny, slender. Head white, face brilliant silvery; mystax with four bristles; mouth black, short, slender; eyes flat in front; antennæ black, almost as long as the breadth of the head; third joint long, slender, lanceolate; thorax deep black; scutellum reddish tawny; hind tibiae black, with tawny tips; wings greyish, veins black; discal veinlet and third externomedial vein forming one straight line, as in the genus *Atomosia*; halteres testaceous. Length of the body 3½ lines; of the wings 6 lines.

Subfam. ASILITES, *Walk.*

Gen. TRUPANEA, *Macq.*

38. *TRUPANEA CONTRADICENS*, n. s. *Mas et Fœm.* Nigricans, cinereo-subtomentosa, thoracis vittis pectoreque cano-tomentosis, pedibus nigris, tibiis rufis apice nigris, alis fusco-cinereis, areola radiali schistaceo vittata. *Mas.* Capite subaurato, harba testaceo-albida, abdominis segmentis lutescente marginatis. *Fœm.* Capite barbaque albidis, abdomine stylato, segmentis cano marginatis.

Male and Female. Blackish. Antennæ and legs black; thorax slightly

covered with cinereous tomentum; stripes, pectus, and underside of the abdomen hoary; tibiæ red, with black tips; wings brownish grey; radial areolet with a slate-coloured stripe. *Male*. Head slightly gilded; mystax with a few black bristles and many gilded bristles; beard testaceous-whitish; sides of the abdomen and hind borders of the segments lutescent. *Female*. Head and beard whitish; mystax with many black bristles and a few white bristles; abdomen with an apical style, more than one-third of the length of the preceding part, sides and hind borders of the segments hoary. Length of the body 12-14 lines; of the wings 14-18 lines.

Gen. *ASILUS*, Linn.

39. *Anilus longistylus*, Wied. *Auss. Zweifl.* 1. 433. 13.
Inhabits also Java.

Gen. *OMMATIUS*, Illiger.

40. *OMMATIUS NOCTIFER*, n. s. *Mas.* Niger, capite aurato, thoracis incisuris, scutello, pectore, segmentorum abdominalium marginibus ventrequè canis, tibiis fulvis apice nigris, alis cinereis costa apiceque nigricantibus, halteribus ferrugineis.

Male. Black. Head gilded; mystax with a few black and several gilded bristles; sutures of the thorax, scutellum, sides, pectus, hind borders of the abdominal segments, and underside hoary; tibiæ tawny, with black tips; wings cinereous, blackish along the costa and towards the tips, veins black; halteres ferruginous. Length of the body 6-6½ lines; of the wings 11-12 lines.

41. *OMMATIUS LUCIFER*, n. s. *Mas.* Æneo-niger, capite argenteo, pectore albido, abdominis segmentis ferrugineo marginatis, pedibus testaceis, femoribus nigro-vittatis, tarsis nigris, alis limpidis apice nigricantibus costa atra apud medium incrassata, halteribus testaceis.

Male. Bronze-black. Head silvery in front; mystax with a few black and a few whitish bristles; pectus whitish; hind borders of the abdominal segments ferruginous; legs testaceous; femora striped with black; tarsi black, ferruginous at the base; wings limpid, blackish at the tips; costa deep black, incrassated in the middle; halteres testaceous. Length of the body 6 lines; of the wings 11 lines.

42. *OMMATIUS RETRAHENS*, n. s. *Fem.* Cinereo-niger, facie argentea, pectore albido, pedibus testaceis, tarsis, femoribus tibiisque apice femoribusque posticis nigris, alis limpidis apice subcinereis, halteribus testaceis.

Female. Cinereous-black. Head silvery white in front; mystax with very few white and black bristles; pectus whitish; legs testaceous; tips of the anterior femora and of the middle tibiæ black; hind femora and hind tarsi black; anterior tarsi and hind tibiæ black, testaceous towards the base; wings limpid, slightly cinereous towards the tips;

veins black; halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

Gen. *LEPTOGASTER*, *Meigen*.

43. *LEPTOGASTER FERRUGINEUS*, n. s. *Mas*. Ferrugineus, pectore albo, abdomine nigro, segmentorum marginibus ventrequae testaceis, pedibus fulvis, femoribus apice nigris, tibiis piceo vittatis, tibiis posticis tarsisque nigris basi testaceis, alis sublimpidis, halteribus testaceis apice piceis.

Male. Ferruginous. Head pale, gilded in front, hind side and pectus white; mouth and antennæ tawny, the latter blackish towards the tips; abdomen black; hind borders of the segments and under side testaceous; legs tawny; anterior femora with a testaceous band before the tips, which are black; hind femora and anterior tibiæ striped with piceous, the latter black towards the tips; tarsi and hind tibiæ black, testaceous at the base; wings very slightly greyish, veins black; halteres testaceous, piceous towards the tips. Length of the body 7 lines; of the wings 10 lines.

44. *LEPTOGASTER LONGIPES*, n. s. *Mas*. Ferrugineus, pectore albido, abdomine piceo, segmentis apice fulvescentibus, pedibus anterioribus fulvescentibus, posticis piceis longissimis, femoribus posticis basi testaceis, alis subcinereis basi obscurioribus costa venisque nigris, halteribus testaceis apice nigris.

Male. Ferruginous. Head testaceous in front; mouth and antennæ black; pectus whitish; abdomen piceous, hind borders of the segments somewhat tawny; legs somewhat tawny; hind legs piceous, very long, their femora testaceous at the base; wings slightly greyish, darker towards the base, costa and veins black; halteres testaceous, with black knobs. Length of the body 4 lines; of the wings 8 lines.

45. *LEPTOGASTER ALBIMANUS*, n. s. *Mas*. Niger, capite antico pectoreque albis, antennis basi ferrugineis, abdominis segmentis cano fasciatis, femoribus, tibiis tarsisque basi albis, femoribus posticis luteo fasciatis, alis limpidis, halteribus albidis apice piceis.

Male. Black. Head in front and the pectus white; antennæ ferruginous at the base; abdomen long, a hoary band on the hind border of each segment; femora, tibiæ, and tarsi white at the base; hind legs long, rather stout; hind femora with a luteous band; wings limpid, veins black; halteres whitish, with piceous knobs. Length of the body 5 lines; of the wings 7 lines.

Fam. *LEPTIDÆ*, *Westw*.

Gen. *LEPTIS*, *Fabr*.

46. *Leptis ferruginosa*, *Wied*. See Vol. I. p. 118.

Gen. *CHRYSOPILO*, *Macg*.

47. *CHRYSOPILO VACILLANS*, n. s. *Mas et Farn*. Lutescens, capite

nigro, thorace subvittato, abdominis segmentis nigro fasciatis, alis sublimpidis apud costam flavescentibus, venis fusco latissime marginatis, stigmatibus nigro-fusco.

Male and Female. Lutescent. Head of the female black, shining; thorax with two brown bands which are paler and indistinct hindward; abdomen with a broad black band on each segment; tarsi blackish towards the tips; wings nearly limpid, yellowish along the costa, veins exteriorly with very broad brownish borders, stigma blackish brown. Length of the body $3\frac{1}{2}$ lines; of the wings .6 lines.

Fam. BOMBYLIDÆ, *Leach.*

Subfam. THEREVITES, *Walk.*

48. *THEREVA CONGRUA*, n. s. *Mas.* Nigra, glaucescente albo tomentosa, albo pilosa, capite argenteo, thorace trivittato et bilineato, pedibus nigris, femoribus albis, alis cinereis stigmatibus elongato venisque nigris.

Male. Black, with glaucous-white tomentum and with white hairs. Head silvery in front; thorax with three blackish brown stripes, the middle one with a dark stripe on each side, broader and more distinct than the lateral pair; abdomen beneath and legs black, femora white; wings grey, with an elongated black stigma and black veins; halteres black. Length of the body 5 lines; of the wings 8 lines.

Subfam. BOMBYLITES, *Walk.*

Gen. ANTHRAX, *Fabr.*

49. *ANTHRAX PELOPS*, n. s. *Mas.* Ferruginea, thoracis margine rufo piloso, pectore abdomineque nigris, abdomine fasciis duabus, maculis duabus apicalibus, plagaque ventrali subtrigona argenteis, alis cinereis, basi costaque nigris.

Male. Closely allied to *A. Tantalus*. Dark ferruginous. Head above, antennæ, pectus, abdomen, and legs black; thorax bordered with red hairs; pectus with a silvery dot on each side; abdomen with red hairs on each side at the base, with two silvery bands, with two silvery apical spots, and with a ventral, nearly triangular, silvery patch; wings cinereous, black at the base and along five-sixths of the length of the costa, veins and halteres black. Length of the body 8 lines; of the wings 18 lines.

50. *Anthrax semiscita*, *Walk.* See Vol. I. p. 118.

51. *Anthrax degenera*, *Walk.* See Vol. I. p. 15.

Gen. GERON, *Meigen.*

52. *GERON SIMPLEX*, n. s. *Mas.* Ater, antennis pedibusque nigris, alis subcinereis, halteribus fulvis.

Male. Deep black. Eyes bright red; proboscis a little longer than the thorax; antennæ and legs black; wings slightly greyish, veins black; halteres tawny. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Fam. EMPIDOÆ, *Leach.*

Gen. HYBOS, *Fabr.*

53. *HYBOS BICOLOR*, n. s. *Mas.* Fulvus, ore antennisque testaceis, abdomine, femoribus posticis apice tibiisque anticis piceis, tarsis anterioribus ferrugineis, alis obscure cinereis.

Male. Tawny. Mouth and antennæ testaceous; abdomen, hind femora and the tips, and fore tibiæ piceous, anterior tarsi ferruginous; wings dark grey, veins black. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Fam. DOLICHOPIDÆ, *Leach.*

Gen. PSILOPUS, *Meigen.*

54. *Psilopus æneus*, *Fabr. Syst. Antl.* 268. 9.

Inhabits also Java.

55. *PSILOPUS BENEDICTUS*, n. s. *Mas et Fem.* Aureo-viridis, facie pectoreque argenteis, antennis testaceis apice nigris, thorace vittis tribus cupreis, abdomine fasciis cupreo-purpureis, maculis lateralibus albidis, pedibus testaceis tibiis posticis tarsisque nigris, alis subcinereis, costam versus et apud venas transversas nigrofuscis, halteribus testaceis. *Fem.* Vertice cyaneo-purpureo, abdomine fasciis cyaneis.

Male and Female. Golden green. Face silvery; antennæ testaceous, black towards the tips, arista full as long as the thorax; thorax with three cupreous stripes; pectus silvery; abdomen with cupreous purple bands and with whitish spots along each side; legs testaceous, tarsi and hind tibiæ black; wings slightly greyish, blackish brown along the costa and about the transverse veins, veins black, fore branch of the præbrachial vein curved inward, discal transverse vein undulating; halteres testaceous. *Female.* Vertex bluish purple; abdomen with blue bands. Length of the body $4-4\frac{1}{2}$ lines; of the wings 7-8 lines.

56. *PSILOPUS LUCIGENA*, n. s. *Mas.* Aureo-viridis, facie pectoreque argenteis, antennis tarsisque nigris, thorace vittis tribus rufo-cupreis, abdomine fasciis cupreo-purpureis, femoribus lutescentibus, tibiis piceis, femoribus anticis apice nigricantibus, alis nigris apice albis, halteribus fulvis apice nigris.

Male. Golden green. Face and pectus silvery; antennæ black, arista longer than the thorax; thorax with three broad reddish cupreous stripes; abdomen with broad cupreous purple bands; femora lutescent, tibiæ piceous, fore femora blackish towards the tips, tarsi

black; wings black, tips snow-white, fore branch of the præbrachial vein slightly curved inward, discal transverse vein much curved outward; halteres tawny, with black tips. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

57. *Psilopus flavicornis*, *Wied. Auss. Zweifl.* 11. 227. 31.

Inhabits also Sumatra.

58. *PSILOPUS TERMINIFER*, n. s. *Mas.* Aureo-viridis, vertice cyaneo-purpureo, facie pectoreque argenteis, antennis, pedibus halteribusque testaceis, abdomine apicem versus atro fasciis duabus cupreis, alis subcinereis apice nigris.

Male. Golden-green, slender. Vertex bluish-purple; face and pectus silvery; antennæ testaceous, arista about half the length of the body; fourth and fifth segments of the abdomen deep black with a cupreous band on the hind border of each segment, tip blue; legs and halteres testaceous; wings greyish, paler along the hind border, tips black, fore branch of the præbrachial vein slightly curved inward, discal transverse vein slightly undulating. Length of the body 3 lines; of the wings 5 lines.

59. *PSILOPUS ORCIFER*, n. s. *Fam.* Purpureus, facie pectoreque subcinereis, antennis, pedibus halteribusque nigris, abdomine cyaneo-viridi segmentorum marginibus posticis purpureis, alis nigricantibus margine postico cinereo. *Var.* Viridis, vertice cyaneo, abdominis segmentis basi nigris.

Female. Purple, rather stout. Face and pectus slightly cinereous; antennæ, legs, and halteres black; abdomen bluish-green, hind borders of the segments purple; wings blackish, cinereous along the hind border, fore branch of the præbrachial vein forming an obtuse angle, discal transverse vein very undulating. *Var.* Green. Vertex blue; abdominal segments black at the base. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

60. *PSILOPUS EGENS*, n. s. *Mas et Fam.* Purpureus, facie pectoreque cyaneo-viridi cinereo subtomentosis, antennis, pedibus halteribusque nigris, metathorace viridi, abdomine cyaneo, suturis nigris, alis cinereis.

Male and Female. Purple. Face and pectus slightly covered with cinereous tomentum, the latter bluish-green; antennæ black, arista much more than half the length of the body; metathorax green; abdomen blue, sutures black; legs and halteres black; wings grey, fore branch of the præbrachial vein much curved inward, discal transverse vein straight; length of the body $2\frac{1}{2}$ – $2\frac{3}{4}$ lines; of the wings 5 lines.

Gen. *DOLICHOPUS*, *Latr.*

61. *DOLICHOPUS TRIGONIFER*, n. s. *Fam.* Cupreo-viridis, facie argentea, antennis, pedibus halteribusque testaceis, pectore, ventre ab-

dominisque maculis lateralibus trigonis albidis, abdomine purpureo marginibus posticis nigris, tarsis posterioribus nigricantibus, alis cinereis.

Female. Cupreous green. Face silvery; antennæ, legs, and halteres testaceous; pectus, abdomen beneath, and triangular spots on each side whitish; abdomen purple, hind borders of the segments black; posterior tarsi blackish; wings grey, veins black, præbrachial vein forming a right angle at its flexure, between which and the border it is much curved inward, discal transverse vein very slightly curved outwards. Length of the body 3 lines; of the wings 5 lines.

This species resembles the *Psilopi* in the structure of the præbrachial vein.

Gen. DIAPHORUS, *Meigen*.

62. DIAPHORUS RESUMENS, n. s. *Mas et Fem.* Obscure viridis (mas) aut niger (fem.), facie pectoreque albidis, antennis piceis, abdomine nigro-cupreo basi obscure testaceo, pedibus anterioribus tibiisque posticis basi obscure testaceis, pedibus posticis nigris, alis nigricantibus apud marginem posticum pallidioribus, halteribus testaceis.

Male and Female. Dark green (male) or black (female). Face and pectus whitish; antennæ piceous; abdomen cupreous-black, dull testaceous towards the base; hind legs black, hind tibiæ towards the base and anterior legs dull testaceous; wings blackish, paler along the hind border, veins black, præbrachial vein and discal transverse vein straight; halteres testaceous. Length of the body 2 lines; of the wings 3½ lines.

Fam. SYRPHIDÆ, *Leach*.

Gen. CERIA, *Fabr.*

63. CERIA SMARAGDINA, n. s. *Fem.* Saturate metallico-viridis, subtilissime punctata, faciei lateribus cupreis, antennis nigris, arista nivea, thorace bivittato, abdomine æneo-viridi, tarsis nigris, alis dimidio costali nigro, halteribus testaceis.

Female. Deep metallic green, very finely punctured. Head blue in front, sides of the face cupreous-purple; mouth, antennæ, and tarsi black; arista snow-white; thorax with two almost contiguous darker stripes; abdomen æneous green, with the exception of the petiole, which is very thick; wings slightly greyish, costal half black; halteres testaceous. Length of the body 7 lines; of the wings 14 lines.

64. CERIA RELICTA, n. s. *Mas.* Nigra, faciei lateribus, thoracis maculis quatuor humeralibus, pectoris fasciis duabus lateralibus, scutæ abdominis maculis duabus basalibus fascisque duabus flavis, flavescantibus apice piceis, alis apud costam nigris, halteribus testaceis. *Male.* Black. Head yellow beneath, and in front with the exception of a black stripe on the disk of the face; arista white; thorax

two yellow spots on each side in front; scutellum yellow; pectus with an oblique yellow band on each side; abdomen not petiolated, with a tumid yellow spot on each side at the base, hind borders of the third and fourth segments yellow; femora at the tips and tibiæ yellow, the latter piceous towards the tips, tarsi piceous; wings greyish-black towards the costa, excepting a lurid costal streak which extends along half the length from the base; halteres testaceous. Length of the body 6 lines; of the wings 11 lines.

65. *CERIA RELICTA*, n. s. *Fæm.* Nigra, faciei lateribus abdominisque fasciis duabus flavis, antennis ferrugineo variis, pedibus fulvis, alis cinereis costam versus nigris, halteribus stramineis.

Female. Black. Head yellow, beneath and in front with the exception of a black stripe on the disk of the face; first and third joints of the antennæ somewhat ferruginous, arista white; thorax with two indistinct yellowish marks on the transverse suture, hind border of the scutellum and hind borders of the second and third abdominal segments yellow; legs tawny, tibiæ paler towards the base; wings green, black for nearly half the breadth from the costa; halteres straw-colour. Length of the body 6 lines; of the wings 11 lines.

This may prove to be the female of *C. relictura*, notwithstanding its great difference from that species in the marks of the thorax and of the abdomen, and in the colour of the legs.

Gen. MICRODON, Meig.

66. *MICRODON FULVICORNIS*, n. s. *Mas.* Niger, aureo-subpubescens, antennis, abdomine, pedibus halteribusque fulvis, femoribus nigris, tibiis nigro vittatis, alis fuscis postice cinereis.

Male. Black. Head with gilded pubescence, cinereous behind and beneath; antennæ tawny, second joint above towards the tip and third joint piceous; thorax slightly covered with gilded tomentum; pectus with cinereous tomentum; abdomen with gilded tomentum towards the tip; legs tawny, femora mostly black, tibiæ with black stripes; wings cinereous, dark-brown about the costa, veinlet which bisects the subapical areolet incomplete, as it is also in the following species; halteres tawny. Length of the body 6 lines; of the wings 12 lines.

67. *MICRODON APICALIS*, n. s. *Mas et Fæm.* Niger, aureo-pubescens, thorace abdomineque fasciatis, pedibus halteribusque fulvis, alis nigro-fuscis postice obscure cinereis.

Male and Female. Black, with gilded tomentum, which forms two bands on the thorax, and one on each side of the pectus; abdomen with three gilded tomentose bands, the third subapical, first segment ferruginous beneath; legs tawny, femora at the base and coxæ black; wings blackish-brown, dark cinereous hindward; halteres tawny. Length of the body 5-6 lines; of the wings 10-12 lines.

Gen. GRAPTOMYZA, *Wied.*

68. *GRAPTOMYZA TIBIALIS*, n. s. *Mas*. Testacea, vertice pectorisque fasciis duabus piceis, antennis supra nigris, abdominis lateribus fasciis duabus subtrigonis apiceque nigris, alis cinereis.

Male. Testaceous. Vertex and mouth piceous; epistoma with a piceous line on each side; third joint of the antennæ black above; abdomen black along each side and at the tip, and with two black bands which are angular in front; wings cinereous. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Gen. ERISTALIS, *Latr.*

69. *ERISTALIS splendens*, *Leguillon, Voy. aut. du Monde; Macq. Dipt. Esot.* 11. 2. 49. 28.

Inhabits also Solomon's Islands.

70. *ERISTALIS RESOLUTUS*, n. s. *Mas et Fem.* Niger, capite antice albo, thorace vittis duabus fasciaque pectorisque disco cinereis, scutello fulvo, abdomine fasciis interruptis æneo-viridibus, tibiis basi fulvescentibus, alis fuscis (mas) aut obscure fuscis (fœm.) basi cinereis, halteribus testaceis.

Male and Female. Black. Head shining, with white tomentum beneath and on each side of the face; third joint of the antennæ piceous, arista simple; thorax with two cinereous stripes and with one cinereous band, somewhat chalybeous towards the scutellum, which is tawny; the band continued on each side of the pectus, whose disk is cinereous; abdomen with an interrupted æneous-green band on the second segment, third and fourth segments æneous-green, each with three large black spots; tibia somewhat tawny towards the base; wings brown (male) or dark brown (female), cinereous towards the base; halteres testaceous. Length of the body 6 lines; of the wings 10 lines.

71. *ERISTALIS CONDUCTUS*, n. s. *Fœm.* Niger, faciei lateribus albis, antennis, scutello, abdominis fasciis pedibusque testaceis, thorace antico albido, alis subcinereis apice obscurioribus.

Female. Black. Head shining, with white tomentum behind, beneath and on each side of the face; antennæ, scutellum, and legs testaceous, arista simple; thorax whitish in front, the whitish part continued in a short band on each side of the pectus; abdomen testaceous at the base and beneath, and with three testaceous bands; hind tibiæ with black tips; wings slightly greyish, darker towards the tips, cubital vein much less bent than usual; halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

72. *ERISTALIS SUAVISSIMUS*, n. s. *Fœm.* Fulvus, capite testaceo, vertice nigro, thorace vittis quinque testaceis, abdomine nigro culis sex lutescentibus, segmentorum marginibus posticis æneis, dibus nigris testaceo fasciatis, alis sublimpidis punctis duobus libus nigris.

Female. Tawny. Head with testaceous tomentum, vertex black, shining; antennæ testaceous, arista simple; thorax with five testaceous stripes; pectus with two oblique testaceous bands on each side; abdomen black, with six somewhat luteous spots, the basal pair larger and darker than the middle pair, which are larger than the hind pair, apical segment with two testaceous points, hind borders of the segments aeneous above, testaceous beneath; legs black, tibiæ at the base and tarsi testaceous; wings nearly limpid, costa with two black points; halteres testaceous. Length of the body $5\frac{1}{2}$ lines; of the wings 10 lines.

73. *ERISTALIS MUSCOÏDES*, n. s. *Mas.* Cyaneo-viridis subchalybeus, capitis callo antennisque fulvis, faciei lateribus albo tomentosis, thorace subvittato, abdomine nigro maculis aeneo-viridibus, pedibus nigris, alis subcinereis, halteribus albis.

Male. Bluish-green, with a slight chalybeous tinge. Face with white tomentum along each side, middle callus tawny, shining; antennæ pale tawny, arista plumose; thorax with three indistinct black stripes, the lateral pair oblique, callus on each side beneath pale tawny; abdomen black, second segment with a broad interrupted bluish green band, third segment with four aeneous-green streaks, fourth segment also with four streaks which are united on the hind border, ventral segments whitish on each side; legs black; femora bluish black towards the base; wings slightly cinereous; halteres white. Length of the body 4 lines; of the wings 8 lines.

Gen. *HELOPHILUS*, *Meigen*.

74. *Helophilus quadrivittatus*, *Wied. Auss. Zweifl.* 11. 168. 22. (*Eristalis*).

Inhabits also Hindostan.

75. *HELOPHILUS MESOLEUCUS*, n. s. *Fam.* Niger, faciei lateribus niveo tomentosus, thorace vittis quatuor canis, scutello, abdominis fascia antica latissima interrupta basique lutescentibus, alis cinereis, venis basi halteribusque fulvis.

Female. Black. Face with snow-white tomentum on each side; thorax with four hoary stripes; pectus with a cinereous disk; scutellum pale luteous; abdomen pale luteous at the base, and with a broad interrupted pale luteous band on the second segment, third and fourth segments somewhat chalybeous, the former livid along the fore border, under side with two lateral abbreviated pale luteous stripes; hind femora thick; wings grey, veins towards the base, and halteres, tawny. Length of the body $6\frac{1}{2}$ lines; of the wings 12 lines.

Gen. *XYLOTA*, *Meigen*.

76. *XYLOTA VENTRALIS*, n. s. *Fam.* Nigro-chalybea, capite albidio tomentoso, scutello fulvo, vittis duabus ventralibus latis abbreviatis

testaceis, pedibus piceo et testaceo variis, alis fuscis basi cinereis, halteribus testaceis.

Female. Blackish chalybeous. Head with whitish tomentum, excepting the callus on the vertex and another on the front; mouth and antennæ black; scutellum tawny; abdomen beneath with two very broad testaceous stripes extending from the base to two-thirds of the length; legs dingy testaceous, femora and hind tibiæ partly piceous, hind femora thick, piceous, slightly chalybeous, armed with spines beneath; wings dark brown, cinereous towards the base; halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Gen. ORTHONEURA, *Macq.*

77. ORTHONEURA BASALIS, n. s. *Fam.* Chalybeo-nigra, nitens, cano-subtomentosa, antennis ferrugineis basi fulvis articulo tertio elongato, tarsis posterioribus piceis, tarsis anticis tibiisque anterioribus fulvis, his nigro fasciatis, alis subcinereis fusco fasciatis, halteribus testaceis.

Female. Chalybeous-black, very shining, partly and slightly covered with hoary tomentum; antennæ tawny, third joint ferruginous, long, linear, tawny at the base; anterior tibiæ tawny with a black band, fore tarsi tawny, hinder tarsi piceous; wings greyish, with a sub-apical brown band which is abbreviated hindward, veins towards the base and halteres testaceous; alulæ whitish. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Gen. SYRPHUS, *Fabr.*

78. *Syrphus ægrotus*, *Fabr.* See Vol. I. p. 124.

79. *Syrphus ericetorum*, *Fabr. Ent. Syst.* iv. 287. 34.

Inhabits also Sierra Leone, Hindostan, and Java.

Fam. MUSCIDÆ, *Latr.*

Subfam. TACHINIDÆ, *Walk.*

Gen. MASICERA, *Macq.*

80. MASICERA NOTABILIS, n. s. *Mas.* Nigra, longiuscula, capite abdominisque fasciis albis, frontalibus atris, pectore cano, scutelli margine postico abdominisque lateribus ferrugineis, alis cinereis, venis fusco marginatis.

Male. Black, rather long, with long stout bristles; head white, silvery, with white hairs behind and beneath, frontalia deep black, widening slightly to the face, facialia without bristles, epistoma not prominent; eyes bare; palpi ferruginous at the tips; antennæ extending to the epistoma, third joint slightly widening towards the tip, nearly four times the length of the second, arista slender, very much longer than the third joint; pectus and sides of the thorax hoary, hind border of the scutellum ferruginous; abdomen fusiform, much longer

than the thorax, with a broad slightly interrupted white band on the fore border of each segment, sides of the second and third segments slightly ferruginous; wings grey, veins black bordered with brown, præbrachial vein forming a slightly acute angle at its flexure, near which it is much curved inward, and is thence straight to its tip, discal transverse vein curved inward, parted by less than its length from the border, and by rather more than half its length from the flexure of the præbrachial; alulæ white; halteres testaceous. Length of the body 6 lines; of the wings 12 lines.

81. *MASICERA?* *TENTATA*, n. s. *Nigra*, cinereo-tomentosa, capite argenteo frontilibus atris, antennarum articulo tertio basi rufo, thorace quadrivittato, abdomine ?, pedibus longiusculis, alis nigricantibus postice cinereis.

Black, with cinereous tomentum and with moderately stout bristles. Head silvery with white hairs behind and beneath, frontalia deep black, slightly widening towards the face, facialia without bristles, epistoma not prominent; antennæ extending nearly to the epistoma; third joint cinereous, slender, linear, red towards the base, rounded at the tip, more than four times the length of the second; arista slender, much longer than the third joint; thorax with four slender black stripes; scutellum not cinereous; abdomen wanting; legs rather long and slender; wings blackish, cinereous hindward and at the tips, veins black, præbrachial vein forming a very obtuse angle at its flexure, from whence it is almost straight to its tip, discal transverse vein slightly undulating, parted by much less than its length from the border, and by a little less than its length from the flexure of the præbrachial; alulæ large, yellowish white; halteres piceous. Length of the body 4½ lines; of the wings 7 lines.

82. *MASICERA SOLENNIS*, n. s. *Fem.* *Nigra*, breviuscula, cinereo-tomentosa, capite albo, frontilibus atris, thorace quadrivittato, scutelli margine postico ferrugineo, abdomine subtessellato, alis cinereis.

Female. Black, rather short, with cinereous tomentum. Head white, with white hairs behind and beneath, frontalia deep black, widening towards the face, facialia without bristles, epistoma not prominent; eyes bare; antennæ almost reaching the epistoma, third joint cinereous, linear, rounded at the tip, more than four times the length of the second, arista slightly stout towards the base, much longer than the third joint; thorax with four slender black stripes; scutellum ferruginous along the hind border; abdomen short-conical, with three broad interrupted cinereous bands; legs rather short; wings grey, veins black, præbrachial vein forming a slightly obtuse angle at its flexure, from whence it is almost straight to its tip, discal transverse vein nearly straight, parted by much less than its length from the border and by a little less than its length from the flexure of the præbrachial; alulæ cinereous. Length of the body 3 lines; of the wings 5 lines.

83. *MASICERA SIMPLEX*, n. s. *Fam.* Nigra, capite albo, frontalibus atris, thorace cinereo-tomentoso quadrivittato, abdomine fasciis cinereis late interruptis, alis cinereis.

Female. Black, with stout bristles. Head white, with white hairs beneath, frontalia deep black, linear, face oblique, facialia without bristles, epistoma not prominent; eyes bare; antennæ almost reaching the epistoma, third joint cinereous, linear, rather broad, almost truncated at the tip, about four times the length of the second, arista slender, very much longer than the third joint; thorax and pectus with cinereous tomentum, the former with four slender black stripes; abdomen shining, subelliptical, a little longer than the thorax, with a widely interrupted cinereous band on the fore border of each segment; legs stout; wings cinereous; veins black; præbrachial vein forming a very obtuse angle at its flexure, from whence it is straight to its tip, discal transverse vein almost straight, parted by hardly less than its length from the border, and by very much more than its length from the flexure of the præbrachial; alulæ white. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

84. *MASICERA GUTTATA*, n. s. *Fam.* Nigra, capite albo, frontalibus atris, thoracis vittis tribus pectoreque cinereis, abdomine guttis lateralibus albis, alis cinereis.

Female. Black, with short slight bristles. Head white, frontalia deep black, widening slightly towards the epistoma, face oblique, facialia without bristles, epistoma not prominent; antennæ reaching the epistoma, third joint linear, slightly truncated at the tip, full four times the length of the second, arista slender; thorax with three cinereous stripes; pectus cinereous; abdomen elongate-oval, a little longer than the thorax, a row of white dots along each side on the fore borders of the segments; wings cinereous, a little darker along the costa towards the base, veins black, præbrachial vein forming a very obtuse angle at its flexure, from whence it is almost straight to its tips; discal transverse vein straight, parted by more than its length from the border and by nearly twice its length from the flexure of the præbrachial; alulæ whitish. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. EURYGASTER, *Macq.*

85. *EURYGASTER TENTANS*, n. s. *Fam.* Nigra, latiuscula, cinereo tomentosa, capite albo, frontalibus atris, thorace vittis quatuor nigris, scutelli margine postico ferrugineo, abdomine subtessellato, alis cinereis apud costam subfuscis.

Female. Black, rather broad, with cinereous tomentum. Head white, with white hairs behind and beneath, frontalia deep black, narrow, widening towards the face, which is oblique, facialia with bristles along more than one-third of the length from the frontalia, epistoma not prominent; eyes pubescent, palpi ferruginous; antennæ ex-

tending to the epistoma, third joint cinereous, hardly widening from the base to the tip, which is somewhat truncated, arista slender, very much longer than the third joint; thorax with four indistinct black stripes; scutellum ferruginous hindward; abdomen conical, not longer than the thorax, with three broad, slightly interrupted, cinereous bands, second segment indistinctly ferruginous on each side; legs stout; wings grey, slightly brownish in front, veins black, testaceous towards the base, præbrachial vein forming an obtuse angle at its flexure, hardly curved inward from thence to its tip, discal transverse vein very slightly undulating, parted by much less than its length from the border and from the flexure of the præbrachial; alulæ whitish. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

86. *EURYGASTER DECIPIENS*, n. s. *Fem.* Nigra, aureo-tomentosa, capite antico argenteo frontalibus atris, antennis ferrugineis, thorace vittis quatuor nigris, abdomine fulvo subtessellato vitta basali nigra, pedibus fulvis, alis cinereis.

Female. Black, stout, with gilded tomentum. Head silvery white in front and beneath, frontalia deep black, widening slightly towards the upright face, the bristles on each side hardly extending to the facialia, epistoma not prominent; eyes bare; antennæ ferruginous, extending to the epistoma, third joint linear, somewhat truncated at the tip, more than four times the length of the second joint, arista slender, much longer than the third joint; thorax with numerous long bristles, with four slight black stripes; pectus cinereous; abdomen tawny, conical, not longer than the thorax, with short stout bristles, and with three broad, slightly gilded, somewhat interrupted bands, a short black stripe at the base; legs tawny, stout, tibiæ darker than the femora, tarsi piceous; wings grey, somewhat darker in front, veins black, præbrachial vein forming a right angle at its flexure, near which it is much curved inward, discal transverse vein nearly straight, parted by more than half its length from the border, and by a little less than its length from the flexure of the præbrachial; alulæ slightly cinereous. Length of the body 4 lines; of the wings 7 lines.

87. *EURYGASTER PHASIOIDES*, n. s. *Mas.* Nigra, cano-tomentosa, capite albo frontalibus atris, antennis, scutello, abdomine femoribusque fulvis, abdomine fasciis duabus posticis albidis vittaque nigra, alis cinereis basi albis, costa plagaque nigricantibus.

Male. Black, with hoary tomentum. Head white, frontalia deep black, widening towards the upright face, facialia with bristles along more than half the length from the epistoma, which is not prominent; eyes bare; palpi testaceous; antennæ tawny, extending to the epistoma, third joint linear, slightly rounded at the tip, more than four times the length of the second joint, arista slender, much longer than the third joint; thorax with four very slender black stripes;

abdomen tawny, short-oval, not longer than the thorax, with a black stripe which does not extend to the tip, third and fourth segments with a white band along each fore border; legs very stout, femora tawny; wings cinereous, white and with testaceous veins at the base, blackish along the costa, and with a broad black band which is abbreviated hindward, præbrachial vein forming an obtuse angle at its flexure, from whence it is very slightly curved inward to its tip, discal transverse vein nearly straight, parted by much less than its length from the border, and by hardly less than its length from the flexure of the præbrachial; alulae whitish. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Subfam. DEXIDÆ, *Walk.*

Gen. RUTILIA, *Dess.*

88. *Rutilia plumicornis*, *Güérin, Macq. Dipt. Esot.* 11. 3. 82. 3. Pl. 9. f. 8.

Inhabits also Offak, New Guinea.

89. *RUTILIA ANGUSTIPENNIS*, n. s. *Fem.* Nigro-viridis, capite cinereo frontilibus atris, thoracis lateribus subpurpurascens, scutello purpureo, abdomine viridi basi purpureo, tibiis ferrugineis, alis angustis lanceolatis obscure fuscis basi nigris.

Female. Blackish-green. Head cinereous, frontalia deep black, widening much towards the face, epistoma very prominent, arista stout, bare; thorax with almost obsolete stripes, purplish along each side; scutellum mostly purple; abdomen dark green, purple at the base; legs black, tibiae ferruginous; wings narrow, lanceolate, dark brown, black towards the base, præbrachial vein forming a much rounded angle at its flexure, near which it is slightly curved inward, and is thence straight to its tip, discal transverse vein very slightly undulating, parted by less than half its length from the border, and by much more than half its length from the flexure of the præbrachial; alulae dark brownish cinereous. Length of the body 8 lines; of the wings 16 lines.

Gen. DEXIA, *Meigen.*

90. *DEXIA PECTORALIS*, n. s. *Fem.* Testacea, capite pectoreque albis frontilibus atris, antennis fulvis, thorace cinereo vittis quatuor nigris, abdomine fulvo apicem versus spinoso fasciis duabus nigris, pedibus longis tibiis tarsisque nigris, alis cinereis venis subfusco late marginatis.

Female. Testaceous. Head white, frontalia deep black, widening towards the face, facialia without bristles, epistoma prominent; antennae tawny, not reaching the epistoma, third joint of the antennae long, linear, arista plumose; thorax cinereous, with four black stripes, of which the inner pair are much narrower than the outer pair; scu-

tellum tawny hindward ; pectus white ; abdomen tawny, with a few spines towards the tip, hind borders of the third and fourth segments and tips black ; legs long, black, coxæ and femora testaceous ; wings grey, veins very broadly bordered with pale brown, præbrachial vein forming a slightly obtuse angle at its flexure, between which and its tip it is slightly curved inward, discal transverse vein undulating, parted by about half its length from the border, and by a little less than its length from the flexure of the præbrachial ; alulæ cinereous. Length of the body 4 lines ; of the wings 9 lines.

Gen. PROSENA, *St.-Furg.*

91. PROSENA ARGENTATA, n. s. *Mas et Fem.* Testacea (mas) aut nigra (fœm.), capite thoraceque argenteis, antennis fulvis, abdomine longo fasciis vittaque nigris (mas) aut brevior fasciis cinereis lateribusque basi testaceis (fœm.), pedibus nigris femoribus testaceis, alis subfuscescentibus (mas) aut cinereis (fœm.).

Male and Female. Head and thorax with bright silvery tomentum, facialia without bristles, epistoma slightly prominent ; eyes bare ; mouth black, testaceous towards the base, full as long as the thorax ; antennæ tawny, not reaching the epistoma, arista plumose ; legs black, coxæ and femora testaceous ; wings grey, veins black. *Male.* Testaceous. Pectus mostly white ; abdomen elongate-conical, with slight whitish reflexions, dorsal stripe and hind borders of the segments black ; legs long ; wings brownish towards the costa and about the veins, præbrachial vein forming a slightly obtuse angle at its flexure, between which and its tip it is very slightly curved inward, discal transverse vein hardly undulating, parted by less than half its length from the border, and by less than its length from the flexure of the præbrachial. Length of the body 5 lines ; of the wings 10 lines. *Female.* Black. Pectus silvery ; scutellum deep black ; abdomen conical, with broad cinereous bands, first and second segments with broad interrupted testaceous bands, a testaceous mark on each side of the third segment at the base ; legs rather long, femora with black tips ; præbrachial vein forming a right angle at its flexure, curved inward from thence to its tip, discal transverse vein curved inward near its hind end, parted by less than its length from the border and from the flexure of the præbrachial. Length of the body $3\frac{1}{2}$ lines ; of the wings 7 lines.

Subfam. SARCOPHAGIDES, *Walk.*

Gen. SARCOPHAGA, *Meigen.*

92. SARCOPHAGA COMPTA, n. s. *Fem.* Nigra, cinereo-tomentosa, capite aurato subtus fulvo piloso, thorace vittis tribus nigris, abdomine tessellato, alis obscure cinereis.

Female. Black, with cinereous tomentum. Head gilded in front, clothed behind and beneath with tawny hairs, frontalia deep black,

hardly widening towards the face; thorax with three black very distinctly marked stripes, the middle one dilated on the scutellum; abdomen distinctly tessellated with six large cinereous excavated spots; wings grey, præbrachial vein forming a right angle at its flexure, near which it is much curved inward, and is thence straight to its tip, discal transverse vein hardly undulating, parted by much less than its length from the border, and by little more than half its length from the flexure of the præbrachial; alulae white. Length of the body 5 lines; of the wings 10 lines.

93. *SARCOPHAGA INVARIA*, n. s. *Mas et Fem.* Nigra, cinereo-tomentosa, capite *maris* albo, thorace vittis quinque nigris, abdomine tessellato, alis cinereis.

Male and Female. Black, with cinereous tomentum. Thorax with five black stripes, the lateral pair incomplete; abdomen distinctly tessellated, the spots being much excavated; wings grey, præbrachial vein forming a right angle at its flexure, near which it is much curved inward, and is thence straight to its tip, discal transverse vein hardly undulating, parted by much less than its length from the border, and by rather more than half its length from the flexure of the præbrachial; alulae white. *Male.* Head silvery white, frontalia deep black, linear; tomentum of the thorax and of the abdomen more whitish than that of the female. *Female.* Frontalia slightly widening towards the face. Length of the body 4-4½ lines; of the wings 8 lines.

Subfam. MUSCIDES, *Walk.*

Gen. *IDIA*, *Meigen.*

94. *Idia australis*, *Walk. Cat. Dipt.* pt. 4. 809.

Inhabits also Australia.

95. *IDIA ÆQUALIS*, n. s. *Fam.* *Ænea*, capite subtuberculato, thoracis lateribus pectoreque albido-testaceis lineis duabus lateralibus æneis, abdomine fulvo fasciis tribus æneis, pedibus testaceis tibiis apice femoribusque æneis, alis cinereis apice nigricantibus.

Female. *Æneous*-whitish, testaceous beneath. Head with minute tubercles on each side of the front, frontalia piceous, linear; thorax with an *æneous* stripe on each side in a line with the base of the wings, and with numerous points between these lines and the disk; abdomen pale tawny, with three *æneous* bands on the hind borders of the segments; legs testaceous, tibiae towards the tips and femora *æneous*; wings greyish, with blackish tips, præbrachial vein forming an obtuse and much-rounded angle at its flexure, from whence it is almost straight to its tip, discal transverse vein parted by about half its length from the border and by about its length from the flexure of the præbrachial; alulae very slightly cinereous; halteres testaceous. Length of the body 3½ lines; of the wings 6 lines.

Gen. *MUSCA*, *Linn.*

96. *MUSCA GLORIOSA*, n. s. (genus *Silbomyia*, *Macq.*). *Fam.* Cyaneo-viridis, capite latissime aurato frontalibus atris, antennis pedibusque nigris, thorace vittis quatuor cupreis, pectore maculis quatuor albis, abdomine viridi-cyaneo, vitta tenui purpurea, alis cinereis apud costam nigris, alulis albis.

Female. Golden green. Head brilliantly gilded, frontalia deep black, widening towards the face; a brilliantly-gilded lanceolate streak between the antennæ, which are black; epistoma piceous, slightly prominent; thorax with four cupreous stripes; pectus with four white tomentose spots; abdomen greenish blue with a very slender purple stripe; legs black, femora blackish green; wings grey, black for full one-third of the breadth from the costa, præbrachial vein forming a very obtuse angle at its flexure, from whence it is nearly straight to its tip, discal transverse vein very slightly undulating, parted by less than half its length from the border, and by more than half its length from the flexure of the præbrachial; alulæ pure white. Length of the body 6 lines; of the wings 12 lines.

97. *MUSCA OPULENTA*, n. s. (genus *Silbomyia*, *Macq.*) *Fam.* Aureo-viridis, capite aurato, frontalibus atris, antennis piceis, thorace vittis quatuor subobsoletis cupreis, pectore maculis duabus albis, alis cinereis apud costam nigris, alulis albis.

Female. Golden green. Head brightly gilded, frontalia deep black, linear, epistoma piceous, slightly prominent; antennæ piceous; thorax with four almost obsolete cupreous stripes; pectus with a spot of white tomentum on each side; abdomen with a very indistinct cupreous stripe; tibiæ and tarsi black; wings grey, black along the costa, præbrachial vein forming a right angle at its flexure, near which it is slightly curved inward, and is thence straight to its tip, discal transverse vein undulating, parted by more than half its length from the border and from the flexure of the præbrachial; alulæ white. Length of the body 4½ lines; of the wings 8 lines.

98. *MUSCA MACULARIS*, n. s. (genus *Chrysomyia*? *Deev.*) *Mas et Fam.* Aureo-viridis, capite argenteo antice aurato frontalibus atris, antennis pedibusque nigris, thorace vittis tribus cupreis vix conspicuis, scutello cyaneo, pectore maculis quatuor lateralibus albo tomentosus, abdomine viridi-cyaneo maculis quatuor lateralibus albis, alis cinereis basi nigricantibus, alulis nigricantibus.

Male and Female. Golden green. Head brightly gilded, white behind; antennæ, tibiæ, and tarsi black; thorax with three indistinct cupreous stripes; scutellum blue; pectus with two white tomentose spots on each side; abdomen greenish blue with two transverse white spots on each side; femora blackish-green; wings grey, blackish at the base, præbrachial vein forming a slightly obtuse angle at its flexure, nearly straight from thence to its tip, discal transverse vein curved

outward towards its fore end, parted by about half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ blackish. *Female*. Head with a silvery white vertex, frontalia deep black, linear. Length of the body 56 lines; of the wings 10-12 lines.

99. *MUSCA MARGINIFERA*, n. s. (genus *Lucilia*, *Desc.*) *Fem.* Viridicyanea, capite albedo frontalibus atris, antennis pedibusque nigris, abdominis segmentis purpureo marginatis, alis cinereis basi subnigricantibus, alulis cinereis.

Female. Greenish-blue. Head whitish, frontalia deep black, linear, face and third joint of the antennæ cinereous; abdomen with a purple band on the hind border of each segment; legs black; wings grey, almost blackish at the base, præbrachial vein forming a hardly obtuse angle at its flexure, between which and its tip it is hardly curved inward, discal transverse vein nearly straight, parted by about half its length from the border, and by more than half its length from the flexure of the præbrachial; alulæ cinereous. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

100. *MUSCA BENEDICTA*, n. s. (genus *Pyrellia*, *Desc.*) *Mas.* Aureoviridis, capite albo, antennis pedibusque nigris, alis cinereis basi subluridis venis basi fulvis, alulis testaceo-cinereis. *Var.?* Abdominis apice purpureo.

Male. Golden green. Head white in front; antennæ and legs black; wings cinereous, slightly lurid towards the base, veins tawny towards the base, præbrachial vein curved at the flexure, almost straight from thence to the tip, discal transverse vein slightly undulating, parted by full half its length from the border, and by little less than its length from the flexure of the præbrachial; alulæ cinereous with a testaceous tinge. *Var.?* or a distinct species: darker; abdomen purple at the tip. Length of the body 3 lines; of the wings 6 lines.

101. *MUSCA OBTRUSA*, n. s. (genus *Pyrellia*, *Desc.*) *Mas et Fem.* Purpureo-cyanea, antennis pedibusque nigris, alis cinereis, alulis obscurioribus.

Very nearly allied to *M. reflexa* and to *M. perfixa*, but differing slightly in the veins of the wings. *Male and Female*. Blue, more or less mingled with purple. Head black, slightly cinereous in front; antennæ and legs black; wings grey, veins black, præbrachial vein forming an almost angular curve at its flexure, nearly straight from thence to its tip, discal transverse vein very slightly undulating, parted by little more than half its length from the border, and by about its length from the flexure of the præbrachial; alulæ dark cinereous. Length of the body $2\frac{1}{2}$ -3 lines; of the wings 5-6 lines.

102. *Musca domestica*, *Lin.* See Vol. I. p. 128.

103. *MUSCA OBSCURATA*, n. s. *Fem.* Nigra, subcinerascens, capite postico albo, thorace vittis quatuor angustis nigris, abdomine tessel-

lato, alis obscure cinereis apud costam nigricantibus, alulis testaceo-cinereis.

Female. Black, slightly covered with cinereous tomentum. Head white behind; thorax with four slender black stripes; abdomen distinctly tessellated with four rows of cinereous reflecting spots; wings very dark grey, blackish towards the costa, præbrachial vein forming a somewhat rounded and very slightly obtuse angle at its flexure, hardly curved inward from thence to its tip, discal transverse vein slightly undulating, parted by less than half its length from the body, and by more than half its length from the flexure of the præbrachial; alulæ cinereous, with a testaceous tinge. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

104. *MUSCA PATIENS*, n. s. *Fæm.* Nigra, cinereo-tomentosa, frontali-bus antennisque piceis, thorace vittis quatuor tenuissimis nigris, abdomine tessellato, alis cinereis.

Female. Black, with cinereous tomentum. Head whitish behind, frontalia piceous, linear; antennæ piceous; thorax with four very slender black stripes; abdomen tessellated; wings grey, veins black, præbrachial vein forming an obtuse and somewhat rounded angle at its flexure, from whence it is hardly curved inward to its tip, discal transverse vein undulating, parted by less than half its length from the border, and by more than half its length from the flexure of the præbrachial; alulæ slightly cinereous, with testaceous borders. Length of the body 3 lines; of the wings 6 lines.

105. *MUSCA ERISTALOÏDES*, n. s. (genus *Pollenia*? *Desc.*) *Mas et Fæm.* Aureo tomentosa, crassa, subtus testacea, capite antico albo frontali-bus antice rufis, antennis piceis basi rufis, thorace vittis tribus abbreviatis fulvis, scutello cyaneo, abdomine cyaneo basi fascisque duabus albis, pedibus fulvis, tibiis tarsisque nigris, alis cinereis apud costam fuscescentibus. *Var. mas.* Minor, thorace vittis tribus nigris.

Male and Female. Body thick; head white; frontalia of the female piceous, linear, red in front; epistoma prominent; proboscis long; palpi whitish; antennæ piceous, red at the base; thorax with gilded tomentum, and with three tawny bands which are abbreviated hindward, scutellum blue; pectus testaceous; abdomen blue, white at the base and with two white bands on the 3rd and 4th segments, 1st segment with a transverse blue spot on each side; legs tawny, tibiæ and tarsi black; wings grey, blackish along the exterior part of the costa, præbrachial vein forming a right but rounded angle at its flexure, near which it is curved inward and is thence straight to its tip, discal transverse vein slightly undulating, parted by a little more than half its length from the border, and by much more than half its length from the flexure of the præbrachial; alulæ testaceous. *Var. Male.* Smaller; thorax with three black stripes; abdomen with only

one white band, which is on the 4th segment. Length of the body 4-5 lines; of the wings 8-10 lines.

Gen. *BENGALIA*, *Desc.*

106. *BENGALIA SPISSA*, n. s. *Mas et Fem.* Fulva, capite nigro antice albo, antennis testaceis, pectore fasciis duabus obliquis albidis, pedibus nigris femoribus basi coxisque fulvis, alis cinereis.

Male and Female. Tawny. Head black, with silvery tomentum in front, epistoma not prominent; palpi black; antennæ testaceous; pectus with an oblique whitish band on each side; legs black, femora towards the base and coxæ tawny; wings grey, veins black, testaceous towards the base, præbrachial vein forming an obtuse and rounded angle at its flexure, which is very near the border of the wing, straight from thence to its tip, discal transverse vein straight, parted by much less than its length from the border, and by very much more than its length from the flexure of the præbrachial; alulæ testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Subfam. *ANTHOMYIDES*, *Walk.*

Gen. *ARICIA*, *Macq.*

107. *ARICIA SIGNIFICANS*, n. s. *Mas et Fem.* Fulva, subtus testacea, capite nigro argenteo-tomentoso, antennis testaceis, thorace vittis tribus albidis, abdominis apice piceo, alis cinereis.

Male and Female. Tawny, testaceous beneath. Head black, with silvery tomentum, vertex much broader in the female than in the male; palpi tawny; antennæ testaceous; thorax with three whitish stripes in the disk, and with one on each side; abdomen piceous at the tip; tarsi blackish towards the tips; wings cinereous, veins black, tawny towards the base, discal transverse vein hardly undulating, parted by more than its length from the præbrachial transverse, and by less than its length from the border; alulæ pale cinereous, with testaceous borders. Length of the body 4 lines; of the wings 7 lines.

108. *ARICIA CANIVITTA*, n. s. *Fem.* Fulva, subtus testacea, capite nigro, facie argentea, palpis antennisque testaceis, thoracis disco, abdominis plagis duabus trigonis pedibusque nigris, thorace vitta cana, alis cinereis.

Female. Tawny, testaceous beneath. Head black, face silvery; palpi and antennæ testaceous; disk of the thorax blackish, with a broad hoary stripe; disk of the scutellum piceous; second and third segments of the abdomen with triangular black bands; legs black, coxæ and trochanters testaceous; wings grey, veins black, discal transverse vein hardly curved inward, parted by more than half its length from the border, and by a little less than its length from the præbrachial transverse; alulæ pale cinereous, with testaceous borders. Length of the body $3\frac{1}{2}$ lines, of the wings 7 lines.

Gen. *ANTHOMYIA*, *Meigen*.

109. *ANTHOMYIA PROCELLARIA*, n. s. *Mas.* Nigra, subtus albida, capite argenteo, thorace fasciis duabus (prima interrupta) albis, abdomine vitta tenui fascisque interruptis albidis, alis cinereis, halteribus testaceis.

Nearly allied to *A. pluvialis* and to *A. tonitruus*. *Male*. Black, whitish beneath. Head silvery; thorax with two whitish bands, the first interrupted in the middle, widened on each side; scutellum elongate; abdomen with a slender whitish stripe, and with interrupted whitish bands, which are widened on each side; wings grey, veins black, discal transverse vein nearly straight, parted by less than half its length from the border and by hardly less than its length from the præbrachial transverse; alulae grey, with testaceous borders; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

Gen. *CÆNOSIA*, *Meigen*.

110. *CÆNOSIA LUTEICORNIS*, n. s. *Mas.* Cana, capite antennisque pallide luteis, abdomine basi testaceo maculis octo nigris, pedibus halteribusque testaceis, alis sublimpidis apice nigris.

Male. Hoary. Head pale luteous, frontalia darker, widening towards the face; palpi white; antennae pale luteous, extending to the epistoma, third joint long, slender, linear, arista plumose for half the length from the base; abdomen testaceous towards the base, with four dorsal black spots and with two black spot on each side towards the tip; legs testaceous; wings nearly limpid, with a black apical spot, discal transverse vein nearly straight, parted by less than its length from the border and by very much more than its length from the præbrachial transverse; alulae white; halteres testaceous. Length of the body 3 lines; of the wings 5 lines.

Subfam. *HELOMYZIDES*, *Fallen*.Gen. *CÆLOPA*, *Meigen*.

111. *CÆLOPA INCONSPICUA*, n. s. *Fem.* Cinerea, antennis piceis, pectore antico, abdomine pedibusque fulvis, his nigro variis, alis cinereis, halteribus testaceis.

Female. Cinereous, flat. Antennae piceous; fore part of the pectus, abdomen and legs tawny, the latter with diffuse blackish bands; wings grey, veins black, with the usual structure, tawny towards the base; halteres testaceous. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

Gen. *XARNUTA*, *Walk*.

112. *Xarnuta leucotalus*, *Walk*. See Vol. I. p. 28.

Gen. *HELOMYZA*, *Fallen*.

113. *HELOMYZA PICIPES*, n. s. *Fem.* Fulva, capite, antennis femoribusque nigris, abdominis segmentis nigro marginatis, tibiis tarsisque piceis, alis cinereis apud costam luridis vena discali transversa fusco subnebulosa, halteribus testaceis. *Var.* Thoracis vitta lata abdomineque piceis.

Female. Tawny. Head and antennæ black, arista plumose; thorax with two slender, darker, almost obsolete stripes; hind borders of the abdominal segments black; legs piceous, femora black, coxæ tawny; wings grey, with a lurid tinge towards the costa, discal transverse vein straight, slightly clouded with brown, parted by about half its length from the border, and by more than twice its length from the præbrachial transverse; halteres testaceous. *Var.* Thorax with a broad piceous stripe; abdomen piceous. Length of the body 3 lines; of the wings 6 lines.

114. *HELOMYZA ATRIPENNIS*, n. s. *Mas.* Fulva, scutello nigro, pectore piceo, abdomine ferrugineo, alis nigris postice cinereis.

Male. Tawny. Antennæ pale tawny, arista plumose; thorax with two slender, darker, almost obsolete stripes; scutellum black; pectus piceous; abdomen ferruginous; wings black, cinereous along the hind border for more than half its length from the base, veins as in the preceding species. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

115. *HELOMYZA RESTITUTA*, n. s. *Fem.* Testacea, abdomine punctis sex nigris, alis cinereis apice nigricantibus venis transversis nigricante nebulosis.

Female. Testaceous. Third, fourth, and fifth segments of the abdomen with two black points on each fore border; wings grey, with a slight lurid tinge towards the costa, blackish at the tips, transverse veins clouded with blackish, veins with the usual structure. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Gen. *DRYOMYZA*, *Fallen*.

116. *DRYOMYZA SEMICYANEA*, n. s. *Fem.* Ferruginea, vertice piceo, antennis fulvis, thorace cyanescente, abdomine cyaneo basi ferrugineo, pedibus testaceis, alis subcinereis apud costam luridis.

Female. Ferruginous. Vertex piceous, face slightly covered with whitish tomentum; antennæ tawny, arista very minutely pubescent; thorax tinged with blue; abdomen blue, tawny at the base; legs testaceous; wings greyish, lurid along the costa, veins tawny, præbrachial vein forming a very slight angle where it joins the discal transverse, with a slight curve from thence to its tip, præbrachial transverse stout, slightly clouded, discal transverse straight, upright, parted by much less than half its length from the border and by;

little more than its length from the præbrachial transverse; halteres testaceous. Length of the body $3\frac{1}{2}$ – $4\frac{1}{2}$ lines; of the wings 7–9 lines.

Gen. SEPEDON, *Latr.*

117. SEPEDON COSTALIS, n. s. *Mas.* Cinerea, capite testaceo guttis quatuor nigris, antennis nigris basi testaceis arista alba, abdomine pedibusque fulvis femoribus posticis denticulatis, alis fuscescenti-cinereis, costa testacea.

Male. Cinereous. Head testaceous, with a black dot on each side above and two more towards the mouth; antennæ black, testaceous at the base, second joint very long, arista white; thorax with four slender indistinct darker lines, pectus hoary; abdomen and legs tawny, tarsi piceous, hind femora denticulated; wings brownish cinereous, slightly testaceous along the costa; halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Subfam. LAUXANIDES, *Walk.*

Gen. LAUXANIA, *Latr.*

118. LAUXANIA DUPLICANS, n. s. *Fem.* Nigro-cyanea, antennis piceis, articulo tertio longissimo, tarsis basi albidis, tibiis intermediis sordide albidis, alis limpidis.

Female. Blackish-blue, shining. Antennæ piceous, third joint very long, reddish beneath, arista bare; legs black, tarsi whitish towards the base, middle tibiæ dingy whitish; wings limpid, veins pale, discal transverse vein white, parted by a little less than its length from the border and by nearly twice its length from the præbrachial transverse; halteres white. Length of the body 2 – $2\frac{1}{2}$ lines; of the wings 3–4 lines.

119. LAUXANIA MINUENS, n. s. *Fem.* Nigra, nitens, antennis longis arista nuda, tarsis albidis, alis sublimpidis, halteribus albis.

Female. Black, shining. Third joint of the antennæ long, arista bare; tarsi whitish; wings very slightly greyish, veins pale, of the usual structure; halteres white. Length of the body $1\frac{1}{2}$ line; of the wings $2\frac{1}{2}$ lines.

Gen. LONCHÆA, *Fallen.*

120. LONCHÆA? INOPS, n. s. *Mas et Fem.* Nigra, nitens, antennis piceis arista plumosa, scutello ferrugineo, tibiis, tarsis halteribusque fulvis, alis subcinereis.

Male and Female. Black, shining. Antennæ piceous, third joint short, arista plumose; scutellum somewhat ferruginous; tibiæ, tarsi, and halteres tawny; wings slightly greyish, veins pale, discal transverse vein parted by much less than its length from the border and by nearly twice its length from the flexure of the præbrachial. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

Subfam. ORTALIDES, *Holiday*.Gen. LAMPROGASTER, *Macq.*

121. LAMPROGASTER QUADRILINEA, n. s. *Mas et Fem.* Cyaneo-viridis; capite pedibusque nigris; antennis piceis, basi rufis; thorace vittis quatuor albidis; abdomine purpureo-cyaneo; alis limpidis, litura basali, fasciis duabus (prima abbreviata, secunda interrupta) strigaeque costali apicali nigris.

Male and Female. Bluish green. Head black; proboscis red at the tip; antennae piceous, red at the base; thorax with two whitish stripes on each side; abdomen purplish blue; legs black, tarsi with pale tomentum towards the base; wings limpid, two black streaks, one basal including a limpid dot, the other apical, first band oblique, extending from the costa to the disk, second widely interrupted in the middle, its hind part occupying the discal transverse vein; veins black, testaceous along the costa; præbrachial vein forming a slight angle at its junction with the discal transverse, the latter parted by not more than one-fourth of its length from the border, and by more than its length from the præbrachial transverse. Length of the body $3\frac{1}{2}$ –4½ lines; of the wings 7–9 lines.

122. LAMPROGASTER MARGINIFERA, n. s. *Fem.* Testacea; capite maculis duabus fascisque nigro-æneis; thoracis disco nigro-æneo, vittis tribus testaceis, vittis duabus lateralibus albidis, scutelli margine testaceo; abdominis dorso nigro-æneo; alis limpidis, fasciis plurimis fuscis.

Female. Testaceous. Head with two blackish æneous spots on the vertex, and with a blackish æneous band in front; mouth and antennae tawny; disk of the thorax blackish æneous, with three testaceous stripes which are united in front, the middle one slender, the lateral pair united on the border of the scutellum, a whitish stripe on each side; abdomen blackish æneous above; wings limpid, with eight or nine irregular brown bands; veins black, testaceous along the costa; discal transverse vein parted by much less than its length from the border, and by about its length from the præbrachial transverse. Length of the body 4 lines; of the wings 9 lines.

123. LAMPROGASTER DELECTANS, n. s. *Fem.* Ferruginea; capite testaceo, postice albido, vertice luteo fasciis duabus nigris, vittis quatuor anticis antennisque nigris; thorace vittis septem et metathoracis fascia albidis; abdomine cyaneo-viridi, basi discoque fulvis; pedibus nigricantibus, femoribus testaceis apice nigris; alis sublimpidis, costa, striga obliqua subcostali guttaque marginali nigricantibus.

Female. Ferruginous. Head testaceous, whitish behind; vertex luteous, blackish in front and behind; fore part with four blackish stripes; antennae blackish; thorax with seven whitish stripes, the middle one broad, the inner pair very slender, the second pair broad, the third pair lateral; abdomen bluish green, slightly varied with

purple, base and fore part of the disk tawny; legs blackish; femora testaceous, with black tips; wings nearly limpid, with a slight lurid tinge in the discal areolet, blackish along the costa, and with a blackish oblique streak which extends from the costa along the præbrachial transverse vein; a blackish dot on the hind end of the discal transverse vein; veins black, discal transverse vein parted by about one-fourth of its length from the border, and by a little more than its length from the præbrachial transverse which is very oblique; alulae white; halteres testaceous, with black knobs. Length of the body 5 lines; of the wings 9 lines.

124. *LAMPROGASTER SCUTELLARIS*, n. s. *Mas*. Subcinereo-nigra; oculis albido submarginatis; thorace vittis tribus cinereis, vittis duabus lateralibus, scutelli subquadrati margine, tibiis intermediis tarsisque albidis; alis nigricantibus, fasciis duabus integris duabusque macularibus incompletis albidis.

Male. Black, with a slight cinereous tinge; eyes partly bordered with whitish; third joint of the antennæ elongate-conical; arista plumose, the bristles few; thorax with three indistinct cinereous stripes, and with two whitish lateral stripes; scutellum nearly quadrate, with a whitish border; middle tibiæ, knees and tarsi whitish, the latter with black tips; wings blackish, whitish at the base, and with four whitish bands, first and third bands entire, second and fourth macular, very irregular and incomplete; veins black; discal transverse vein straight, parted by about one-fourth of its length from the border, and by hardly more than its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

This species has some resemblance to the genus *Platystoma*, and differs rather from the characters of *Lamprogaster*; it and the two following species, which are still more aberrant, will probably be considered as three new genera.

125. *LAMPROGASTER CELYPHOIDES*, n. s. *Mas et Fæm*. Atra, nitens, brevis, lata; capite, antennis pedibusque testaceis; abdomine nigro-cyaneo; alis limpidis, strigis transversis subcostalibus fuscescentibus.

Male and Female. Deep black, shining, short, broad. Head testaceous, face transverse; antennæ testaceous, third joint elongate-conical; arista bare; abdomen blackish blue, second segment very large, third and following not visible; legs testaceous; wings limpid, with four transverse pale brown subcostal streaks; discal transverse vein parted by less than half its length from the border, and by less than its length from the flexure of the præbrachial; halteres testaceous. Length of the body 2-2½ lines; of the wings 4½ lines.

126. *LAMPROGASTER TETVROIDES*, n. s. *Mas*. Atra, nitens, brevissima, latissima; capite transverso, subruguloso; thorace scitissime punctato; abdomine cyaneo; tarsis flavis; alis nigris albedo punctatis apud marginem posticum obscure cinereis.

Male. Deep black, shining, very short and broad. Head transverse, slightly rugulose; third joint of the antennæ conical; arista thinly plumose; thorax very finely punctured; scutellum almost semicircular; abdomen blue, smooth; tarsi yellow; wings black, dark grey towards the hind border, with whitish points towards the costa; discal transverse vein parted by about its length from the border and by more than its length from the præbrachial transverse. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Gen. *PLATYSTOMA*, Latr.

127. *PLATYSTOMA FUSIFACIES*, n. s. *Mas et Fæm.* Cinerea; capite postice et apud oculos albo; vertice pallide luteo (mas) aut rufo (fæm.); facie plana, fusiformi, subargentea; antennis piceis; thoracis vittis tribus pectoreque canis; abdomine conico punctis albis; alis limpidis, guttis transversis interioribus fascisque exterioribus nigricantibus.

Male and Female. Cinereous. Head white hindward and about the eyes, black and shining towards the mouth; vertex pale luteous in the male, red in the female; face flat, fusiform, somewhat silvery; antennæ piceous, third joint long, slender, linear, arista plumose; thorax with three hoary stripes, the middle one much broader than the lateral pair; pectus hoary; abdomen conical, with numerous white points; wings limpid, with blackish dots towards the base, and with four exterior blackish bands, two of which are dilated towards the costa, and there contain some limpid dots; veins black, discal transverse vein straight, parted by about one-fourth of its length from the border, and by more than its length from the præbrachial transverse; halteres whitish. Length of the body $3\frac{1}{4}$ –5 lines; of the wings 8–10 lines.

128. *PLATYSTOMA MULTIVITTA*, n. s. *Mas.* Cinerea; capite postice et apud oculos albo, vertice luteo, facie et antennis fulvis; thoracis vittis octo pectoreque canis; abdominis segmentis cano fasciatis; ventre ferrugineo; pedibus nigris; alis limpidis, fasciis quatuor strigisque interioribus nigricantibus.

Male. Cinereous. Head white behind and about the eyes, vertex luteous; face and antennæ tawny, third joint of the latter long, slender, linear; arista very slightly plumose; thorax with eight hoary stripes; pectus hoary; abdomen with a hoary band on the fore border of each segment; legs black; wings limpid, with four blackish bands, and with some blackish marks nearer the base; two blackish streaks between the first and second bands; veins black; discal transverse vein straight, parted by one-fourth of its length from the border, and by very much more than its length from the præbrachial transverse; halteres black. Length of the body 4 lines; of the wings 8 lines.

Gen. DACUS, *Fabr.*

129. *DACUS EXPANDENS*, n. s. *Fam.* Fulvus, latiusculus; antennarum articulo tertio piceo angusto lineari longissimo; abdomine vitta tenui nigricante; alis limpidis, costa vittaque postica fuscescentibus.

Female. Tawny, rather broad, very slightly covered with hoary tomentum, which forms stripes on the thorax and indistinct bands on the abdomen; third joint of the antennæ piceous, slender, linear, very long; arista bare; abdomen with a slender blackish stripe; wings limpid, brownish along the costa, and with a short oblique brownish stripe extending from the base to the interior border; veins black, discal transverse vein oblique, parted by full one-fourth of its length from the border, and by more than its length from the præbrachial transverse; halteres testaceous. Length of the body 4 lines; of the wings 8 lines.

130. *DACUS PECTORALIS*, n. s. *Fam.* Cinereo-niger; capite fulvo, facie guttis duabus nigris; antennarum articulo tertio piceo angusto lineari longissimo; callis duabus humeralibus, fasciis duabus obliquis pectoralibus lateralibus, scutello tarsisque testaceis; thoracis vittis tribus abdominisque una canis; pedibus fulvis piceo cinctis; alis limpidis, costa vittaque postica fuscescentibus.

Female. Black, slightly covered with cinereous tomentum. Head tawny, with two small black dots on the face; third joint of the antennæ piceous, slender, linear, very long, arista bare; thorax with three indistinct hoary stripes; humeral calli, an oblique band on each side of the pectus, scutellum and tarsi, testaceous; abdomen with one hoary stripe; legs tawny, with diffuse piceous bands; wings limpid, brownish along the costa, and with a short oblique brownish stripe, extending from the base to the interior border; veins black; discal transverse vein parted by less than one-fourth of its length from the border, and by a little more than its length from the præbrachial transverse; halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings $7\frac{1}{2}$ lines.

131. *DACUS LATIFASCIA*, n. s. *Fam.* Niger; capite postice et apud oculos albedo; antennarum articulo tertio vix longo; thoracis fascia, metathorace pectorisque fasciis duabus obliquis canis; abdomine cyaneo; femoribus albidis apice nigris; alis albo-limpidis, costa atra, fasciis duabus latissimis nigris; halteribus testaceis.

Female. Black. Head whitish behind and about the eyes; third joint of the antennæ linear, round at the tip, hardly long, arista plumose; thorax with a band on the hind border of the scutum; metathorax and an oblique band on each side of the pectus hoary; abdomen blue; coxæ and femora whitish, the latter with black tips; wings limpid white, deep black along the costa, and with two very broad black bands; veins black; discal transverse vein very oblique, parted

by about one-sixth of its length from the border, and by little more than half its length from the præbrachial transverse; halteres testaceous. Length of the body 4 lines; of the wings 8 lines.

132. *DACUS MUTILLOIDES*, n. s. *Fem.* Rufescens; capite nigro, postice et apud oculos albo; antennarum articulo tertio angusto lineari longissimo; thoracis vittis tribus, pectoris fasciis duabus obliquis lateralibus abdominisque fasciis duabus (secunda interrupta) albis, abdominis dimidio postico nigro-æneo; pedibus piceis; alis sublimpidis, costæ apice venisque transversis nigro nebulosis; halteribus albidis.

Female. Reddish. Head black, white behind and about the eyes and on the grooves of the face; antennæ black, reddish at the base, third joint slender, linear, very long, arista bare, rather stout; thorax with three whitish stripes; pectus with a more distinct oblique white band on each side; metathorax whitish; abdomen æneous, pubescent, finely punctured, reddish and slightly contracted towards the base, with two white bands, the second widely interrupted; oviduct long, lanceolate; legs piceous; wings nearly limpid, clouded with black at the tip of the costa and on the præbrachial transverse vein, hardly clouded on the discal transverse vein; veins black; discal transverse vein straight, parted by about one-fourth of its length from the border, and by much more than its length from the præbrachial transverse; halteres whitish. Length of the body 5 lines; of the wings 8 lines.

133. *DACUS LONGIVITTA*, n. s. *Mas.* Æneo-viridis, subpubescens, subtilissime punctatus; capite nigro apud oculos albido, epistomate ferrugineo, antennarum articulo tertio longo lineari; thorace subvittato; pedibus nigris, femoribus ferrugineis; alis subcinereis, costa vittaque apud venam præbrachialem nigris; halteribus piceis.

Male. Æneous green, with slight hoary tomentum, very finely punctured. Head black, whitish about the eyes; epistoma ferruginous, prominent; antennæ black, ferruginous at the base, third joint long, linear, conical at the tip; arista bare; thorax with an indistinct broad hoary stripe; abdomen compressed, nearly linear; legs black; femora ferruginous; wings slightly greyish, black along the costa and with a black stripe which extends along the præbrachial vein to the discal transverse vein; veins black; discal transverse vein straight, oblique, parted by a little more than half its length from the border, and by very much more than its length from the præbrachial transverse; halteres piceous. Length of the body 4-6 lines; of the wings 5-7 lines.

134. *DACUS LATIVENTRIS*, n. s. *Fem.* Nigro-viridis, subtilissime punctatus; capite piceo apud oculos albido; antennis fulvis, articulo tertio sublanceolato; abdomine brevi, lato; pedibus nigris, femoribus anticis fulvis; alis subcinereis, costa vittaque apud venam præbra-

chiale nigris, vena discali transversa nigricante nebuloa; halteribus albidis.

Female. Blackish green, very minutely punctured. Head piceous, whitish about the eyes; epistoma ferruginous, slightly prominent; antennæ tawny, third joint rather long, somewhat lanceolate, arista bare; abdomen nearly round, broader than the thorax; legs black, fore femora tawny; wings very slightly greyish, black along the costa to the tip of the præbrachial vein, with a black stripe along the præbrachial vein to the discal transverse vein, and with a blackish tinge about the discal transverse vein and along the adjoining part of the hind border; veins black, discal transverse straight, vein parted by less than half its length from the border, and by very much more than its length from the præbrachial transverse; halteres whitish. Length of the body 2 lines; of the wings 4 lines.

135. *DACUS OBTRUDENS*, n. s. *Mas.* Nigro-viridis, subtilissime punctatus; capite nigro apud oculos albedo; antennis piceis basi rufescentibus, articulo tertio lineari longissimo; abdomine lineari maculis duabus lateralibus testaceis; pedibus nigris, femoribus apice tarsisque posticis basi fulvis; alis subcinereis, costa, apice maculaque apud venam transversam discalem nigricantibus; halteribus albis.

Male. Dark green, very minutely punctured. Head black, whitish about the eyes, ferruginous towards the epistoma; antennæ piceous, reddish towards the base; third joint linear, very long, arista bare; abdomen linear, compressed, with a testaceous spot on each side before the middle; legs black, femora tawny towards the tips, hind tarsi tawny at the base; wings slightly greyish, blackish along the costa and at the tips, and about the transverse veins; veins black, tawny at the base; discal transverse vein straight, oblique, parted by about half its length from the border, and by a little more than its length from the præbrachial transverse; halteres white. Length of the body 4 lines; of the wings 7 lines.

136. *DACUS POMPILOIDES*, n. s. *Mas.* Niger; capite albedo, epistomate ferrugineo; antennis piceis basi rufis, articulo tertio longo lineari; abdomine nigro-cyaneo; pedibus piceis; alis subcinereis, striga costali basali, fascia tenui postice abbreviata et triente apicali strigam subcineream includente nigricantibus; halteribus albis.

Male. Black. Head with whitish tomentum, epistoma ferruginous, prominent; antennæ piceous, red at the base, third joint long, linear, arista bare; abdomen linear, blackish blue, longer than the thorax; legs piceous; wings slightly greyish, with a blackish costal streak extending from the base, with a slender blackish band which is abbreviated hindward, and with more than one-third of the apical part blackish and including a slightly greyish streak; veins black, discal transverse vein straight, oblique, parted by a little less than its length from the border and by about its length from the præbrachial trans-

verse; halteres white. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Gen. BREA, n. g.

Platystomæ affinis. *Facies* lata. *Antennæ* breves; articulus tertius longiconicus; arista nuda. *Femora* intermedia incrassata, denticulata. Allied to *Platystoma*. Face broad; antennæ short, third joint elongate-conical; arista bare; middle femora incrassated, denticulated beneath.

137. BREA DISCALIS, n. s. *Mas*. Nigra; capite testaceo apud oculos albido, fronte ochracea; antennis piceis basi rufescentibus; thorace vitta lata cana; abdomine fulvo, disco nigro cupreo; pedibus fulvis, femoribus anticis apice tibiisque anticis basi nigris; alis sublimpidis, fascia media lata postice abbreviata guttam limpidam subcostalem includente lineaque transversa exteriore nigricantibus; halteribus testaceis.

Male. Black. Head testaceous, whitish about the eyes, front ochraceous; antennæ piceous, reddish at the base; thorax with a broad hoary stripe; abdomen tawny, with a blackish cupreous disk; legs tawny, fore femora at the tips and fore tibiæ at the base black; wings nearly limpid, with a broad middle blackish band, which is abbreviated hindward and includes a limpid dot by the costa, and has beyond it a blackish transverse line; veins black, testaceous towards the base; discal transverse vein straight, upright, parted by half its length from the border, and by much more than its length from the præbrachial transverse; halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

138. BREA CONTRARIA, n. s. *Mas et Fem.* Nigra; capite fulvo apud oculos albido, fronte ochracea; antennis rufescentibus; thorace vitta cana; abdomine purpureo apice cyaneo; pedibus nigris, femoribus anticis tarsisque testaceis; alis sublimpidis, fascia lata media postice abbreviata, guttis interioribus lineaque transversa exteriore nigricantibus.

Male and Female. Black. Head tawny, whitish about the eyes; antennæ reddish; thorax with a hoary stripe; sides and pectus also hoary; abdomen purple, blue towards the tip; legs black; tarsi and fore femora testaceous; wings nearly limpid, with a broad blackish middle band which is abbreviated hindward, with some interior blackish dots, and with an exterior transverse blackish line; veins black; discal transverse vein straight, parted by less than half its length from the border, and by less than its length from the præbrachial transverse; halteres black. Length of the body $3-3\frac{1}{2}$ lines; of the wings 6-7 lines.

Gen. ADRAMA, n. g.

Mas. *Corpus* longiusculum. *Caput* thorace vix latius, setis duabus posticis erectis. *Antennæ* sat longæ; articulus tertius linearis, apice

conicus; arista pubescens. *Abdomen* sublineare, thorace longius et angustius. *Pedes* mediocres; femora posteriora spinis minutis armata. *Alæ* sat longæ.

Male. Body rather long. Head transverse, hardly broader than the thorax, with two erect setæ on the hind part of the vertex; face vertical; epistoma slightly prominent. Antennæ nearly reaching the epistoma; third joint long, linear, conical at the tip; arista pubescent. Abdomen almost linear, longer and narrower than the thorax. Legs moderately long and slender; posterior femora with minute spines beneath. Wings rather long; discal transverse vein straight, upright, parted by hardly half its length from the border, and by rather more than its length from the præbrachial transverse.

139. *ADRAMA SELECTA*, n. s. *Mas.* Testacea; capite guttis tribus nigris; thorace disco antico vittisque duabus posterioribus nigris; tibiis tarsisque anticis piceis, tibiis posticis subpiceis; alis subfuscescentibus, fascia lata limpida nigricante marginata postice abbreviata.

Male. Testaceous. Head with a black dot above the antennæ and one on each side of the epistoma; thorax with the fore part of the diak black, and with two hindward black stripes; fore tibiæ and fore tarsi piceous; hind tibiæ somewhat piceous; wings slightly brownish, with two blackish bands, the first on the præbrachial transverse vein, abbreviated hindward, the second on the discal transverse vein, abbreviated in front, intermediate space limpid, veins testaceous, black towards the tips; halteres pale testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

GEN. ORTALIS, *Fallen*.

140. *ORTALIS PROMPTA*, n. s. *Fæm.* Nigro-viridis; capite piceo apud oculos albedo; antennis rufescentibus; thorace vitta abdomineque fasciis cinereis; pedibus nigris; alis limpidis, vittis tribus nigris, prima postice abbreviata, secunda tertiarum latis; halteribus albidis.

Female. Blackish green. Head piceous, whitish about the eyes; epistoma somewhat prominent; antennæ reddish, third joint somewhat lanceolate, piceous towards the tip; arista bare; thorax with a cinereous stripe; sides and pectus also cinereous; abdomen with two cinereous bands; legs black; wings limpid white, slightly cinereous towards the base, with three black bands, the first abbreviated hindward, the second and third very broad; veins black, discal transverse vein curved inward, parted by much less than its length from the border and by a little less than its length from the præbrachial transverse; halteres whitish. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

141. *ORTALIS COMPLENS*, n. s. *Mas et Fæm.* Nigro-viridis; capite antennisque testaceis, articulo tertio brevi, arista plumosa; abdomine atro; pedibus testaceis, femoribus nigris; alis albo limpidis, strigis

duabus apiceque nigro-cinereis, fasciis tribus satis nigricantibus; halteribus albis. *Mas.* Vertex luteo postice nigro, femoribus apice testaceis, alarum fasciis subconnexis. *Fem.* Vertex nigro, tibiis nigris, posticis basi testaceis.

Male and Female. Blackish green. Head testaceous; antennæ testaceous, third joint short, conical; arista plumose; abdomen deep black; legs testaceous; femora black; wings limpid white, with three broad blackish stripes, the second emitting a branch from its outer side to the costa, a streak connected with the outer side of the third band, and the tips blackish cinereous; discal transverse vein straight, parted by much less than its length from the border, and by a little more than its length from the præbrachial transverse; halteres white. *Male.* Vertex luteous, black hindward; femora with testaceous tips; bands of the wings partly connected. *Female.* Vertex black; tibiæ black, the hind pair testaceous towards the base. Length of the body $1\frac{1}{2}$ -2 lines; of the wings 3-4 lines.

Gen. TRYPETA, Meigen.

142. TRYPETA MULTISTRIGA, n. s. *Fem.* Testacea; thorace pectoreque nigro-strigatis; abdomine maculis quatuor lateralibus anterioribus fascia lata apiceque nigris; femoribus posterioribus nigro vittatis; alis nigricantibus basi marginali maculis guttisque albis.

Female. Testaceous. Third joint of the antennæ short, conical; arista plumose; thorax with black bristles on each side, with eight black streaks, four in front, of which the middle pair are very short, four hindward, the middle pair short, the outer pair connected in front of the scutellum, two lateral black streaks; pectus with a black interrupted streak on each side; disk also black; abdomen with two transverse black spots on each side towards the base, and with a broad black band; oviduct black, flat, lanceolate, obtuse at the tip; posterior femora striped with black; wings blackish, limpid for a space from the base along the costa and along the hind border, and with twelve white marks of various size, four discal, eight marginal; discal transverse vein nearly straight, parted by one-fourth of its length from the border, and by about its length from the præbrachial transverse. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

143. TRYFETA DORSIGUTTA, n. s. *Mas.* Atra; capite piceo vitta testacea, subtus albo; antennis testaceis; thorace cinereo punctis lateralibus albis, pectore albedo; abdominis segmentis testaceo marginatis; tibiis albedo fasciatis, tarsis albidis; alis albo-limpidis, strigis basalibus fasciisque duabus latis nigricantibus, prima antice furcata; halteribus albis.

Male. Deep black. Head piceous, with cinereous tomentum, white behind and beneath, a testaceous stripe on the vertex; antennæ testaceous, black at the base, third joint conical, white at the base,

arista plumose; thorax with cinereous tomentum, white points along each side; pectus whitish; hind borders of the abdominal segments testaceous with cinereous tomentum; tibiæ with a dingy whitish band; tarsi dingy whitish; wings limpid white, with several blackish marks towards the base and with two broad blackish bands, the first forked in front; discal transverse vein nearly straight, parted by less than its length from the border, and by more than twice its length from the præbrachial transverse; halteres white. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

144. *TRYPETA BASALIS*, n. s. *Mas.* Nigra, nitens; capite antennisque fulvis, vertice maculis duabus piceis; abdomine basi pedibusque testaceis; alis limpidis, striga basali, fasciis tribus costaque apicali nigricantibus; halteribus testaceis.

Male. Black, slender, shining. Head tawny, with two elongated piceous spots on the vertex; antennæ tawny, third joint linear, rather long, arista bare; abdomen nearly fusiform, testaceous at the base; legs testaceous; wings limpid, with a blackish oblique streak extending from the base, with three blackish bands, and with a blackish costal streak extending round the tip, first and third bands slender, second broad, abbreviated like the first hindward; discal transverse vein straight, parted by about one-fourth of its length from the border, and by less than its length from the præbrachial transverse; halteres testaceous. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

145. *TRYPETA IMPLETA*, n. s. *Fem.* Cinerea; capite albido; antennarum articulo tertio albido apice nigro; thorace vitta fusca, scutello albido, abdomine nigro; pedibus albidis nigro fasciatis; alis albis, maculis plurimis nigricantibus ex parte confluentibus; halteribus albidis.

Female. Cinereous. Head whitish; third joint of the antennæ short, conical, whitish, blackish at the tip, arista plumose; thorax with a brown stripe; scutellum whitish; abdomen black; legs whitish, with black bands; wings white, with many blackish spots, some of them confluent; discal transverse vein straight, parted by much less than its length from the border, and by a little less than its length from the præbrachial transverse; halteres whitish. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

146. *TRYPETA SUBOCELLIFERA*, n. s. *Mas.* Cana; antennis albidis; thorace guttis fuscis, scutelli margine albido; abdomine fusco apicem versus cano maculis fuscis; pedibus albidis fusco fasciatis; alis limpidis, maculis nigricantibus pallido signatis ex parte confluentibus.

Male. Hoary. Antennæ whitish, third joint short, conical, arista plumose; thorax with some slight brown dots; scutellum brown, hind borders of the scutellum white; abdomen brown, hind borders of the segments and apical part cinereous, the latter with brown dots; legs whitish, with brown bands; wings limpid, with several blackish

dots containing pale marks, some of them confluent and forming a middle band; discal transverse vein straight, enclosed in a pale streak, parted by much less than its length from the border and by much more than its length from the præbrachial transverse; halteres whitish. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

Subfam. ACHIIDES, *Walk.*

Gen. ACHIAS, *Fabr.*

147. *ACHIAS LONGIVIDENS*, n. s. *Mas et Fem.* Viridi-cinerea; capite testaceo fasciis duabus vittisque tribus anticis nigris; antennis nigris; thorace vittis quatuor purpureo-nigris, pectore ferrugineo; abdomine viridi-fulvo; pedibus piceis; alis limpidis, costa lurido-nigricante, vena transversa discali fusco nebulosa; halteribus testaceis apice nigris. *Mas.* Oculis longissime petiolatis, scutello viridi, femoribus basi fulvis. *Fem.* Oculis subpetiolatis, scutello nigro-purpureo.

Male and Female. Greenish cinereous. Head with two black bands on the vertex and with four black stripes in front; antennæ black, third joint linear, very long, arista plumose; thorax with four purplish black stripes, middle pair abbreviated hindward and having behind them a spot of the same hue, lateral pair interrupted; pectus ferruginous; abdomen tawny, with bright green reflections, testaceous beneath; legs piceous; wings limpid, blackish, and with a lurid tinge along the costa, whence a short oblique blackish streak proceeds by the præbrachial transverse vein; discal transverse vein clouded with brown, hardly curved, parted by less than one-third of its length from the border, and by much more than its length from the præbrachial transverse, which is very oblique; halteres testaceous, with black tips. *Male.* Head with the fore black band interrupted; eyes with very long petioles, the latter about three-fourths of the length of the body; scutellum green; femora tawny towards the base. *Female.* Eyes with short petioles, extending a little beyond the sides of the thorax; scutellum blackish purple. Length of the body 5-6 lines; of the wings 12-13 lines.

148. *ACHIAS LATIVIDENS*, n. s. *Fem.* Viridi-cinerea; capite testaceo, vittis tribus anticis nigris, oculis subpetiolatis; antennis nigris; thorace vittis quatuor purpureo-nigris, scutello cyaneo basi viridi, pectore fulvo; abdomine viridi-fulvo; pedibus nigris, femoribus basi luteis, tibiis luteo fasciatis; alis subcinereis, vitta costali nigricante interrupta lurida strigata, vena transversa discali fusco nebulosa; halteribus testaceis apice nigris.

Female. Greenish cinereous. Head testaceous, with three black stripes on the face; eyes very slightly petiolated; antennæ black; thorax with four purplish black stripes; scutellum blue, green at the base; pectus tawny; abdomen tawny, with bright green reflections; legs black; femora luteous towards the base; tibiae with indistinct luteous

bands; wings slightly greenish, with a blackish interrupted costal stripe containing luteous streaks; discal transverse vein clouded with brown; veins in structure like those of the preceding species; halteres testaceous, with black tips. Length of the body 6 lines; of the wings 13 lines.

This species at first sight seems like a variety of the preceding one, but the petioles of the eyes are shorter and thicker, the costal stripes of the wings are interrupted, and the shade on the discal transverse vein is more diffuse.

149. *ACHIAS AMPLIVIDENS*, n. s. *Fam.* Fulva, subtus testacea; oculis extantibus non petiolatis; thorace submetallico, vittis quinque cinereis; abdomine purpureo basi testaceo, tibiis tarsisque nigris; alis subcinereis, costa nigro-fusca, venis transversis nigro-fusco nebulosis.

Female. Tawny, testaceous beneath. Head testaceous; eyes very prominent, but hardly petiolated; antennæ tawny; thorax slightly metallic, with five cinereous stripes, which are abbreviated hindward, the inner pair slender; abdomen purple, testaceous at the base; legs black; coxæ and femora testaceous, the latter with black tips; wings slightly greyish, costal stripe brown, blackish towards the tip; præbrachial transverse vein clouded with blackish, discal transverse vein clouded with a much paler hue than that of the præbrachial transverse vein, in structure like those of the two preceding species; halteres testaceous, with black tips. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

Subfam. ——— ?

Gen. *POLYARA*, n. g.

Mas. *Corpus* longiusculum. *Caput* transversum; facies lata, plana, non obliqua. *Palpi* lati. *Antennæ* parvæ; articulus tertius longiconicus; arista plumosa. *Thorax* oblongo-subquadratus. *Abdomen* sublineare, thorace multo longius et angustius. *Pedes* breves, tenues. *Alæ* latiusculæ; venæ optime determinatæ; venæ duæ transversæ inter venas radialem et cubitalem; vena præbrachialis apicem versus valde flexa.

Male. Body rather long. Head transverse, a little broader than the thorax; face broad, flat, vertical. Palpi broad. Antennæ small; third joint elongate-conical, not extending more than half the length to the epistoma; arista plumose. Thorax oblong-subquadrate. Abdomen nearly linear, much longer and more slender than the thorax. Legs short, rather slender; fore femora somewhat setose beneath. Wings rather broad, flat in repose; veins very strongly marked; a transverse vein between the cubital and mediastinal veins; two transverse veins between the radial and cubital veins; cubital vein slightly angular between the præbrachial transverse vein and the tip of the wing; præbrachial vein much curved towards its tip.

The structure of the wing veins in this genus is very peculiar, and it does not agree well with any of the established subfamilies of *Muscide*.

150. *POLYARA INSOLITA*, n. s. *Mas.* Testacea; faciei sulcis albidis; abdomine lutescente fulvo; alis subcinereis, nigricante-fusco submarginatis et subfasciatis.

Male. Testaceous, paler beneath. Facial grooves for the antennæ whitish; thorax with some almost obsolete stripes, the middle pair approximate, slender, somewhat more distinct than the others; abdomen somewhat lutescent-tawny; wings slightly greyish, irregularly blackish-brown along the costa, brown at the tips, and with a brown band which is indistinct in front but much darker on the discal transverse vein; præbrachial vein largely bordered with brown; veins black, testaceous towards the base, discal transverse vein straight, parted by about one-sixth of its length from the border, and by rather less than half its length from the præbrachial transverse; alulæ very small. Length of the body $5\frac{1}{4}$ lines; of the wings 10 lines.

Subfam. SEPSIDES, *Walk.*

Gen. *ANGITULA*, n. g.

Fam. *Corpus* convexum, glaberrimum, nitidissimum. *Caput* subrotundum; epistoma valde prominens. *Antennæ* epistoma non attingentes; articulus tertius longiusculus, linearis, apice conicus; arista subpubescens. *Thorax* anticus valde productus et attenuatus; scutellum bispinosum; metathorax magnus, declivis. *Abdomen* longisubfusiforme; segmentum primum gibbosum. *Pedes* longi, graciles; coxæ anticæ longissimæ. *Alæ* longæ, angustæ; alulæ obsoletæ.

Female. Body convex, very smooth and shining. Head nearly round; front subquadrate; face short; epistoma very prominent. Mouth short. Antennæ not reaching the epistoma; third joint linear, rather long, conical at the tip; arista somewhat pubescent. Thorax much produced and attenuated in front; scutellum armed with two spines; metathorax slanting, well developed. Abdomen elongate-subfusiform, longer and much more slender than the thorax; first segment gibbous above. Legs long, slender, without bristles; fore coxæ very long. Wings long, narrow; discal transverse vein straight, upright, parted by less than half its length from the border, and by nearly twice its length from the præbrachial transverse.

151. *ANGITULA LONGICOLLIS*, n. s. *Fam.* Nigro-ænea; capite subtus albedo, frontis disco rufescente, fascia albida; antennis piceis basi rufis; pedibus nigris, femoribus basi coxisque anticis albidis; alis limpidis, costa nigra.

Female. Æneous black. Head whitish beneath, front with a reddish disk, face whitish. Antennæ piceous, first and second joints red;

legs black, bare; femora towards the base and fore coxæ whitish; wings limpid, with a black costal line extending to the tip of the præbrachial vein; veins and halteres black. Length of the body 5 lines; of the wings 8 lines.

Gen. SEPSIS, *Fallen.*

152. SEPSIS BASIFERA, n. s. *Mas et Fæm.* Nigra; thorace nigro-æneo; tarsi, femoribus basi pedibusque anticis testaceis; alis limpidis, costâ basi nigra. *Mas.* Metatarsis intermediis dilatatis, alis apice vix nigricantibus. *Fæm.* Alis apice nigris.

Male and Female. Black, shining. Thorax æneous black; pectus cinereous; tarsi, femora at the base, and fore legs, pale testaceous; wings limpid; costâ at the base and veins black. *Male.* Basal joint of the intermediate tarsi dilated; wings hardly blackish at the tips. *Female.* Wings black at the tips. Length of the body 2-2½ lines; of the wings 3-3½ lines.

Gen. CALOBATA, *Fabr.*

153. Calobata albitarsis, *Wied. Auss. Zweifl.* 71. 544. 22.
Inhabits also Java and Australia.

154. Calobata indica, *Desv. Ess. Myod.* 737. 4. (Nerius).
Inhabits also Hindostan.

155. Calobata Abana, *Walk. Cat. Dipt.* pt. 4. 1054.

156. CALOBATA SEPSOIDES, n. s. *Fæm.* Nigra; antennis ferrugineis, articulo tertio conico brevi, arista nuda; pedibus testaceis nigricante subnotatis, femoribus anticis nigris basi testaceis, tibiis anticis nigris, tarsi anticis niveis, posticis albidis; alis subcinereis, fasciis duabus indistinctis fusciscentibus.

Female. Black, shining. Antennæ ferruginous, third joint short, conical, arista bare; pectus slightly covered with cinereous tomentum; legs testaceous, with a few very indistinct blackish marks; fore femora black, testaceous towards the base; fore tibiæ black; fore tarsi snow-white, black at the base; hind tarsi whitish; wings greyish, with two almost obsolete brownish bands; discal transverse vein parted by less than its length from the border and by about four times its length from the præbrachial transverse. Length of the body 5 lines; of the wings 7 lines.

Gen. CARDIACEPHALA, *Macq.*

157. CARDIACEPHALA DEBILIS, n. s. *Fæm.* Testacea, gracilis; thorace linea transversa interrupta nigra; pedibus anticis parvis, posterioribus longis, tarsi albis brevissimis, tibiis anterioribus piceis; alis limpidis apice cinereis, fascia lata pallide lutea.

Male. Testaceous, slender. Vertex somewhat luteous; third joint of

the antennæ conical, very short, arista bare; thorax attenuated in front, with a transverse interrupted black line hindward; abdomen longer than the thorax, lanceolate hindward; fore legs short, posterior legs long; tarsi white, very short; anterior tibiæ piceous; middle femora rather thicker than the hind pair; wings limpid, grey towards the tips, with a pale luteous middle band; veins testaceous, cubital and præbrachial converging towards the tips of the wings, discal transverse vein straight, parted by less than its length from the border and by about thrice its length from the præbrachial transverse. Length of the body $3\frac{1}{2}$ lines; of the wings 5 lines.

Subfam. PSILIDES, *Walk.*

Gen. LISSA, *Meigen.*

158. LISSA CYLINDRICA, n. s. *Mas.* Cyanea, gracilis, cylindrica; antennis piceis basi albidis, arista plumosa; abdomine piceo basi apiceque cyaneis; pedibus albidis, femoribus posterioribus nigris apice albidis, femoribus posticis subtus spinosis, tibiis posticis nigris; alis subcinereis apice subfuscis; halteribus albidis apice nigris.

Male. Blue, slender, cylindrical. Head broader than the thorax; antennæ whitish, third joint piceous, arista plumose; abdomen piceous, slightly increasing in breadth to the tip, blue at the base and at the tip, hind borders of the first and second segments whitish; legs whitish, posterior femora black, whitish at the base and towards the tips, hind femora spinose beneath, hind tibiæ black; wings slightly greyish, brownish towards the tips; veins black, præbrachial and perbrachial very near together for more than half their length, discal transverse vein straight, parted by more than its length, and by about four times its length from the præbrachial transverse; halteres whitish, with black tips. Length of the body $3\frac{1}{2}$ lines; of the wings 5 lines.

Gen. NERIUS, *Fabr.*

159. *Nerius duplicatus*, *Wied. Auss. Zweifl.* 11. 553. 8.

Inhabits also Java.

Subfam. OSCINIDES, *Haliday.*

Gen. OSCINIS, *Fabr.*

160. OSCINIS LINEIPLENA, n. s. *Mas.* Fusca; capite subtus testaceo apud oculos albo, vitta frontali alba; thorace pectoreque lineis sex albidis; abdomine sordide testaceo, pedibus albidis, tibiis tarsisque apice femoribusque anticis nigris; alis subcinereis, halteribus albidis.

Male. Brown. Head testaceous in front and beneath, white about the eyes, with a white stripe on the front; thorax and pectus with six whitish stripes on each, thorax with an indistinct middle testaceous

stripe; abdomen dull testaceous; legs whitish; tibiæ and tarsi at the tips and fore femora black; wings greyish; veins black, discal transverse vein oblique, parted by more than its length from the border, and by full twice its length from the præbrachial transverse; halteres whitish. Length of the body 2 lines; of the wings 3 lines.

161. *OSCINIS NOCTILUX*, n. s. *Mas.* Atra; capite pallide flavo subtus albo; antennis luteis, arista nuda; scutello, maculis duabus pectoralibus abdominisque apice albis; tibiis tarsisque intermediis testaceis; alis nigricantibus postice cinereis, halteribus niveis.

Male. Black. Head pale yellow, black hindward, white beneath; antennæ pale luteous, third joint very short, arista bare; scutellum white; pectus with a white spot on each side; abdomen white at the tip; middle legs with testaceous tibiæ and tarsi; hind wings blackish, cinereous hindward; halteres snow-white. Length of the body $\frac{1}{2}$ line; of the wings $1\frac{1}{2}$ line.

Subfam. GEOMYZIDES, *Fallen.*

Gen. *DROSOPHILA*, *Fallen.*

162. *DROSOPHILA*? *FINIGUTTA*, n. s. *Mas.* Fulva; capite antice testaceo, antennis testaceis, articulo tertio conico; abdomine maculis quatuor apicalibus nigris, tarsis nigris; alis cinereis venis nigris.

Male. Tawny. Head testaceous in front; antennæ testaceous, third joint conical; abdomen with two black spots on each side at the tip; legs testaceous; tarsi black; wings grey; veins black, discal transverse vein straight, parted by full half its length from the border and by full twice its length from the præbrachial transverse; halteres testaceous. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

163. *DROSOPHILA*? *MELANOSPILA*. *Fem.* Testacea; antennarum articulo tertio conico, arista plumosa; thoracis disco abdominisque guttis duabus apicalibus atris; tarsis piceis; alis subcinereis.

Female. Testaceous. Vertex luteous; third joint of the antennæ conical; arista plumose; disk of the thorax and a dot on each side of the tip of the abdomen deep black; tarsi piceous; wings slightly greyish; veins black, discal transverse vein straight, parted by about half its length from the border and by twice its length from the præbrachial transverse. Length of the body 1 line; of the wings 2 lines.

164. *DROSOPHILA*? *IMPARATA*. *Fem.* Pallide testacea; pedibus pallidioribus; alis subcinereis, venis pallidis.

Female. Pale testaceous, with a few bristles. Legs paler than the body; wings slightly greyish; veins pale, discal transverse vein straight, parted by about twice its length from the border and by more than twice its length from the præbrachial transverse. Length of the body $\frac{1}{2}$ line; of the wings $1\frac{1}{2}$ line.

Subfam. HYDROMYZIDÆ, *Haliday*.Gen. EPHYDRA, *Fullen*.

165. EPHYDRA? TACITURNA, n. s. *Fem.* Atræ, nitens, antennis nigris, arista plumosa, abdomine nigro-cupreo, pedibus nigro-piceis, alis nigricantibus, venis nigris.

Female. Deep black, shining. Antennæ black, third joint linear, rather long, arista plumose; legs blackish-piceous; wings blackish; veins black, discal transverse vein straight, parted by a little more than its length from the border. Length of the body $1\frac{1}{2}$ line; of the wings $2\frac{1}{2}$ lines.

Fam. PHORIDÆ, *Haliday*.

Gen. PALLURA, n. g.

Mas. Corpus latiusculum, pubescens. Os retractum. Oculi pubescentes. Antennæ brevissimæ; arista longissima. Scutellum magnum, conicum. Abdomen subellipticum, thorace non longius. Pedes latiusculi, pubescentes, non setosi. Alæ amplæ, venis æqualibus.

Male. Body rather broad, pubescent. Proboscis small, withdrawn; eyes pubescent; antennæ very short, arista very long; scutellum large, conical, very prominent, extending beyond the base of the abdomen; abdomen nearly elliptical, not longer than the thorax; legs rather broad, pubescent, without bristles; wings rather long and broad; veins of equal size, costal vein ending at rather before half the length of the wing, radial ending at somewhat in front of the tip of the wing, cubital ending at hardly in front of the tip, præbrachial ending at a little behind the tip, pabrachial ending on the hind border at half the length of the wing, discal transverse vein straight, parted by more than twice its length from the border and from the præbrachial transverse.

166. PALLURA INVARIA. *Mas.* Lutea, immaculata, alis cinereis basi luteis, apice nigricantibus, venis nigris robustis.

Male. Luteous, of one colour. Wings grey, luteous at the base, blackish towards the tips; veins black, robust. Length of the body 3 lines; of the wings 6 lines.

Fam. HIPPOBOSCIDÆ, *Leach*.Gen. ORNITHOMYIA, *Leach*.

167. Ornithomyia parva?, *Macq. Hist. Nat. Dipt.* 11. 2. 279. 3.

KEY ISLAND.

Fam. ASILIDÆ, *Leach*.Subfam. LAPHRITES, *Walk*.Gen. LAPHRIA, *Fabr*.

1. *LAPHRIA PARADISIACA*, n. s. *Mas*. Cuprea, aureo pilosa, capite pectoreque argenteis albo pilosis, mystace subaurato setis nonnullis nigris, abdomine apice purpureo subtus albido piloso, pedibus cyaneo-purpureis albido pilosis, femoribus cyaneo-viridibus, alis nigricantibus basi cinereis, halteribus albidis nigro notatis.

Male. Cupreous, with gilded hairs. Head and pectus silvery, with white hairs; mystax slightly gilded, with a few long black bristles; antennæ and mouth black; abdomen purple at the tip, underside clothed with long whitish hairs, silvery white at the base, the following segments bordered with silvery white; legs blue and purple, thickly clothed with long whitish hairs, femora bluish-green, fore tibiæ with pale gilded down beneath, hind tibiæ with a black bristly apical tuft beneath; wings blackish, grey towards the base; halteres whitish, marked with black. Length of the body 11 lines; of the wings 20 lines.

2. *LAPHRIA PLACENS*, n. s. *Mas*. Cyanea, capite aurato, mystace setis paucis longis nigris; antennis nigris, articulo tertio fusiformi; pectore albido, abdomine angusto, femoribus intus tibiisque purpureis; alis nigricantibus basi cinereis, halteribus piceis.

Male. Blue. Head gilded in front, whitish behind; mystax with a few long black bristles; proboscis and antennæ black, third joint of the latter fusiform; pectus whitish; abdomen cylindrical, much narrower than the thorax, and about twice its length; femora on the inner side and tibiæ purple, tarsi black; wings blackish, cinereous towards the base; halteres piceous. Length of the body 4½ lines; of the wings 8 lines.

Subfam. ASILITES, *Walk*.Gen. ASILUS, *Linn*.

3. *ASILUS SUPERVENIENS*, n. s. *Mas*. Cinereus, capite subaurato, mystace aurato setis paucis nigris, thorace vittis tribus latissimis nigris, abdomine fulvescenti-cinereo, pedibus rufescentibus, femoribus nigro vittatis, tarsis nigris, alis cinereis apice nigricantibus, halteribus testaceis.

Male. Cinereous. Head slightly gilded, pale cinereous, and clothed with pale hairs behind; mystax composed of gilded bristles, above which there are a few shorter black bristles; antennæ black, third joint elongate-fusiform, arista much longer than the third joint; thorax with three very broad hardly divided black stripes; abdomen

with a slight fawn-coloured tinge, tip black, sexualia very small; legs reddish, femora striped above with black, tarsi black, reddish at the base; wings cinereous, blackish towards the tips; halteres testaceous. Length of the body 8 lines; of the wings 14 lines.

Gen. OMMATIUS, *Illiger*.

4. *Ommatius noctifer*, *Walk.* See page 88.

Fam. EMPIDÆ, *Leach*.

Gen. HYBOS, *Fabr.*

5. *HYBOS DEFICIENS*, n. s. *Mas.* Niger, thorace fulvo globoso macula dorsali nigra, abdomine basi fulvo, pedibus anterioribus testaceis, femoribus posticis subtus spinosis, alis cinereis apice obscurioribus, stigmatibus venisque nigris, halteribus testaceis, apice piceis.

Male. Black. Thorax and pectus tawny, the former globose, with a black dorsal spot; abdomen tawny at the base; anterior legs testaceous, hind femora spinose beneath; wings grey, darker at the tips; stigma and veins black; halteres testaceous, with piceous tips. Length of the body 2 lines; of the wings 4 lines.

Fam. SYRPHIDÆ, *Leach*.

Gen. ERISTALIS, *Latr.*

6. *Eristalis resolutus*, *Walk.* See p. 95.

Gen. BACCHA, *Fabr.*

7. *BACCHA PURPURICOLA*, n. s. *Fam.* Purpureo-fulva; capite chalybeo; antennis rufis; pedibus fulvis; tibiis posticis apice tarsisque posticis basi piceis; alis nigricantibus, apud costam obscurioribus, spatio apicali subcostali cinereo; halteribus testaceis.

Female. Tawny, tinged with purple. Head chalybeous; antennæ red; legs tawny, hind tibiæ piceous towards the tips, hind tarsi piceous towards the base; wings blackish, darker along the costa, cinereous towards the tips with the exception of the costa; halteres testaceous. Length of the body $5\frac{1}{2}$ lines; of the wings 9 lines.

Fam. MUSCIDÆ, *Latr.*

Subfam. SARCOPHAGIDÆ, *Walk.*

Gen. SARCOPHAGA, *Meigen*.

8. *SARCOPHAGA BASALIS*, n. s. *Mas.* Nigra, subaureo tomet capite aurato; thorace vittis tribus nigris; abdomine albido lato; alis cinereis; venis lurido marginatis; alulis testaceis.

Male. Black, with slightly gilded tomentum. Head gilded; frontalia deep black, hardly widening in front; thorax with three black stripes, an indistinct blackish line on each side of the middle stripe; abdomen tessellated with white; wings grey; veins bordered with a lurid hue, especially towards the costa; præbrachial vein forming a slightly acute angle at its flexure, near which it is much curved inward, and is thence straight to its tip; discal transverse vein slightly curved inward near its hind end, parted by a little more than half its length from the border and from the præbrachial transverse; alulæ testaceous. Length of the body $5\frac{1}{2}$ lines; of the wings 9 lines.

Subfam. MUSCIDES, *Walk.*

Gen. IDIA, *Meigen.*

9. *Idia xanthogaster*, *Wied. Auss. Zweifl.* 11. 349. 2.

Inhabits also Hindostan and Java.

10. *Idia testacea*, *Macq. Hist. Nat. Dipt.* 77. 246. 3.

Inhabits also Mauritius.

Gen. MUSCA, *Linn.*

11. *Musca obtrusa*, *Walk.* See p. 105.

Subfam. ANTHOMYIDES, *Walk.*

Gen. ARICIA, *Macq.*

12. *ARICIA VICARIA*, n. s. *Fæm.* Fulva, subtus testacea; capite nigro, apud oculos albo; antennis testaceis; alis cinereis, apud costam luridis.

Female. Tawny, testaceous beneath. Head black, white about the eyes; antennæ testaceous; abdomen clothed with short black bristles; legs testaceous, tarsi piceous; wings grey, with a lurid tinge towards the costa; veins black, discal transverse vein nearly straight, parted by about its length from the border, and by a little more than its length from the præbrachial transverse; alulæ slightly testaceous; halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

13. *ARICIA SQUALENS*, n. s. *Fæm.* Nigra, cinereo tomentosa; facie argentea; antennis testaceis; thorace vittis nigris vittisque duabus lateralibus latis testaceis; abdomine obscure testaceo; pedibus piceis; femoribus nigris; tibiis anticis testaceis; alis cinereis; apud costam subluridis; venis halteribusque testaceis.

Female. Black, with cinereous tomentum. Face silvery white; antennæ pale testaceous, third joint long, linear, extending to the epistoma; thorax with black stripes, and on each side with a broad testaceous stripe; abdomen dull testaceous; legs piceous; femora black, fore tibiæ testaceous; wings grey, with a lurid tinge towards

the costa; veins testaceous, discal transverse vein very slightly curved inward, parted by much less than its length from the border, and by a little more than its length from the præbrachial transverse; alulæ whitish; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

Subfam. ORTALIDES, *Holiday*.

Gen. LAMPROGASTER, *Macq.*

14. LAMPROGASTER VENTRALIS, n. s. *Fam.* Testaceo-cinerea; capite apud oculos albo, vertice luteo, facie pallide fulva; thorace lineis septem indistinctis nigricantibus; abdomine fusco maculis dorsalibus canis, subtus cavo lateribus ferrugineis; pedibus nigris, tibiis ferrugineo fasciatis; alis limpidis basi subtestaceis, fasciis incompletis guttisque fuscis apud costam nigricantibus.

Female. Cinereous, with a testaceous tinge. Head white about the eyes, vertex luteous; face pale tawny, with white grooves for the antennæ; antennæ tawny, small; arista slightly plumose at the base; thorax with seven indistinct blackish lines; abdomen brown, with dorsal hoary nearly triangular spots, under side marsupial-like or with a pouch, ferruginous on each side; legs black, each tibia with a ferruginous band; wings limpid, slightly testaceous at the base, with brown dots and bands, the latter abbreviated hindward, blackish towards the costa; veins black, testaceous towards the base; discal transverse vein straight, parted by about one-third of its length from the border and by much more than its length from the præbrachial transverse; alulæ cinereous; halteres testaceous. Length of the body 5 lines; of the wings 10 lines.

Gen. TRYPETA, *Meigen*.

15. TRYPETA RORIPENNIS, n. s. *Fam.* Fusca; capite nigro, facie alba; antennis nigris rufo-fasciatis; thorace vittis quatuor canis; abdominis segmentis testaceo marginatis; pedibus nigris, tarsis halteribusque testaceis; alis nigris, punctis plurimis albis.

Female. Brown. Head black; face white; antennæ black, third joint red, linear, rather long, black towards the tip; arista plumose; thorax with four hoary stripes; abdominal segments with testaceous hind borders; legs black, tarsi testaceous; wings black, with very numerous white points, a few of which are rather larger than the others; discal transverse vein straight, parted by less than its length from the border, and by more than twice its length from the præbrachial transverse; halteres testaceous. Length of the body 2 lines; of the wings 4 lines.

Catalogue of Hymenopterous Insects collected by Mr. A. R. WALLACE at the Islands of Aru and Key. By FREDERICK SMITH, Esq., Assistant in the Zoological Department, British Museum. Communicated by W. W. SAUNDERS, Esq., F.R.S., V.P.L.S.

[Read December 8rd, 1858.]

THIS Collection of Hymenoptera is the most important contribution which has been made to the Aculeata through the exertions of Mr. Wallace; in point of geographical distribution, it adds much to our knowledge. In the Aru, Key, and neighbouring islands, we meet with the extreme range of the Australian insect-fauna; and as might be expected, it is found amongst the Vespidae Group, and in one or two instances in the Formicidae. The latter, being frequently conveyed from one island to another, can perhaps scarcely be considered indicative of natural geographical distribution. Of the forty-six species of the Formicidous Group, only six were previously known to science. Of the genus *Podomyrma* here established, one species only, from Adelaide, was previously known; it is one of the most distinct and remarkable genera in the family. The *Pompilidae* are species of great beauty, some closely resembling those of Australia in the banding and maculation of their wings; amongst the *Vespidae* will be found some of the most elegant and beautiful forms in the whole of that protéan family of Hymenoptera.

Fam. ANDRENIDÆ.

Gen. PROSOPIS.

1. *PROSOPIS MALACHISIS*. *P. nigro-cæruleo-viridis, nitida et delicatè punctata; alis hyalinis.*

Female. Length $4\frac{1}{2}$ lines. Deep blue-green. with tints of purple in certain lights, particularly on the head, the clypeus with a central longitudinal ridge, its anterior margin slightly emarginate; the flagellum rufo-piceous beneath, the ocelli white. Thorax: the wings hyaline and brilliantly iridescent; the legs dark rufo-piceous with a bright purple tinge. Abdomen delicately punctured, the head and thorax more strongly so; the latter with a semicircular enclosed space at its base, which is smooth and shining.

Hab. Key Island.

Gen. NOMIA.

1. *NOMIA CINCTA*. *N. nigra, capite thoraceque punctatis, pedibus ferrugineis; segmentis abdominis apice fulvo-testaceo late fasciatis.*

Female. Length 5 lines. Black: the two basal joints of the flagellum,

the apical margin of the clypeus, the labrum, mandibles, and legs ferruginous; the wings fulvo-hyaline, the nervures ferruginous, the tegulæ more or less rufo-testaceous; the sides of the metathorax with tufts of pale fulvous pubescence and the floccus on the posterior femora of the same colour, the tibiæ and tarsi with short ferruginous pubescence. Abdomen shining, the apical margins of the segments broadly fulvo-testaceous, very bright, having a golden lustre.

Hab. Key Island.

2. *NOMIA LONGICORNIS*. *N. nigra*, lucida et delicatulè punctata, facie pube brevi griseâ tectâ, femorum posticorum flocco pallido, tibiis externè fusco-pubescentibus; maris antennis, capite thoraceque longioribus.

Male. Length 4 lines. Brassy, with tints of green on the clypeus, metathorax, and thorax beneath; the head and thorax very closely and finely punctured; the clypeus produced and highly polished; the mandibles rufo-testaceous, the antennæ as long as the head and thorax. Thorax: the wings hyaline and splendidly iridescent, the tegulæ and the tarsi rufo-testaceous. Abdomen closely punctured, the apical margins of the segments smooth and shining; the head and thorax above with a pale fulvous pubescence, that on the sides of the metathorax and legs pale and glittering; the abdomen has a pale scattered glittering pubescence.

Hab. Aru.

3. *NOMIA DENTATA*. *N. nigra* et punctata, facie metathoracisque lateribus cinereo-pubescentibus, postscutello medio unidentato. *Mas.* antennis filiformibus longitudine thoracis.

Female. Length 5 lines. Black; head and thorax rather finely punctured; the face covered with short cinereous pubescence; the clypeus naked and much produced, the anterior margin and the tips of the mandibles ferruginous; the cheek with long whitish pubescence. Thorax: the sides of the metathorax, the floccus on the posterior femora and the postscutellum with whitish pubescence, the latter produced in the middle into a blunt tooth; the legs fusco-ferruginous, with the anterior tibiæ and apical joints of the tarsi brighter; wings hyaline and iridescent. Abdomen shining and punctured, the apical margins of the two basal segments broadly depressed, and more finely and closely punctured than the rest; the apical margins of the second, third, and fourth segments pale testaceous; the apical margins of the two basal segments narrowly fringed with white pubescence, usually more or less interrupted in the middle.

Male. Resembles the female very closely, but has the face much more pubescent; the antennæ filiform and longer than the head and thorax; the scutellum armed at its posterior lateral angles with an acute tooth; the metathorax truncate and slightly concave, its base with six longitudinal grooves, the lateral margins fringed with long pubescence.

Hab. Aru.

Subfam. DASYGASTRÆ.

Gen. MEGACHILE, *Latr.*

1. MEGACHILE LATERITIA. *M. nigra*, abdomine pube ferrugineâ vestito, alis fuscis.

Female. Length 8 lines. Black; head and thorax very closely and finely punctured; the mandibles with a single blunt tooth at their apex; the anterior margin of the clypeus transverse. Thorax: the wings brown, the posterior pair palest, their base subhyaline. Abdomen clothed with bright brick-red pubescence above and beneath; the basal segment with bright yellow pubescence above.

Hab. Aru.

2. MEGACHILE SCABROSA. *M. nigra*, metathorace anticè rudè scabrato, abdomine subtùs nigro-pubescente.

Female. Length $5\frac{1}{2}$ lines. Black; the clypeus, mesothorax anteriorly, and the posterior tibiæ outside coarsely rugose, the roughness on the thorax consisting of transverse little elevated points; the face with a thin griseous pubescence; the anterior margin of the clypeus fringed with fulvous hairs; the cheeks have a long pale fulvous pubescence. Thorax: the wings hyaline, the nervures black. Abdomen smooth and shining, with black pubescence beneath; beneath, the apical margins of the segments with a fringe of very short white pubescence.

Hab. Aru.

3. MEGACHILE INSULARIS. *M. nigra*, nitida, delicatulè punctata, facie pube pallidè fulvâ vestitâ, abdomine subtùs pube lætè ferrugineâ vestito, alis hyalinis.

Female. Length $5\frac{1}{2}$ lines. Black; the head and thorax finely and closely punctured, the abdomen delicately so; the face clothed with pale fulvous pubescence, the mandibles with two blunt teeth at their apex; the clypeus shining and strongly punctured. Thorax: the wings subhyaline with a slight cloud at their apex; the basal joint of the posterior tarsi with a dense dark ferruginous pubescence within. Abdomen: the four basal segments with transverse impressed lines in the middle; beneath, clothed with bright ferruginous pubescence; the abdomen has an obscure æneous tinge above.

Hab. Aru.

Gen. CROCISA, *Jurine.*

1. CROCISA NITIDULA, *Fabr. Syst. Piez.* p. 386. 2.

Hab. Aru; Key Island; Australia; Amboyna.

Gen. ALLODAPE, *St.-Farg.*

1. ALLODAPE NITIDA. *A. nitida nigra*, clypeo flavo, alis hyalinis, abdomine ad apicem punctato.

Female. Length 3 lines. Black and shining; the clypeus yellow, pro-

duced in front; the sides of the face depressed; the ocelli prominent and reddish. Thorax very smooth and shining; the wings colourless and iridescent, their extreme base yellowish, the nervures and stigma brown, the tegulæ pale testaceous-yellow; the posterior tibiæ with a scopa of glittering white hairs, the tarsi ferruginous and with glittering hairs. Abdomen, from the third segment to the apex, gradually more and more strongly and closely punctured.

Hab. Aru.

Gen. *XYLOCOPA*, *Latr.*

1. *Xylocopa æstuans*, *Linn. Syst. Nat.* i. p. 961. 53 ♀; *St.-Farg. Hym.* ii. p. 193. 36 ♂ ♀.

Hab. Aru; India; Singapore; Celebes.

Gen. *SAROPODA*, *Latr.*

1. *Saropoda bombiformis*, *Smith, Cat. Hym. Ins.* pt. 2. p. 318. 6.

Hab. Aru; Australia (Richmond River).

Gen. *ANTHOPHORA*, *Latr.*

1. *Anthophora zonata*, *Linn. Syst. Nat.*

Hab. Aru Island; Celebes; Ceylon; India; Borneo; Hong-Kong; Shanghai; Philippine Islands.

2. *ANTHOPHORA ELEGANS*. *A. nigra*, pube capitis thoracisque nigrâ, abdomine fasciis quatuor lætè cæruleis ornato; tibiis posticis ferrugineo-pubescentibus.

Female. Length 6 lines. Black; the labrum, a narrow line down the middle and another on each side of the clypeus, a minute spot above it, and the scape in front testaceous yellow, the base of the mandibles of a paler colour; the flagellum fulvous beneath. Thorax: the pubescence black; wings subhyaline, the nervures dark rufo-fuscous, tegulæ obscurely testaceous. Abdomen with four fasciæ of brilliant blue, which is changeable, with pearly tints in different lights; the posterior tibiæ densely clothed outside with fulvo-ferruginous pubescence; the pubescence inside is black.

Hab. Key Island.

Gen. *TRIGONA*, *Jurine*.

1. *Trigona læviceps*, *Smith, Cat. Hym. Ins., Journ. Proc. Linn. Soc.* ii. p. 51. 8.

Hab. Aru; Singapore; India.

Fam. *FORMICIDÆ*.

Gen. *FORMICA*.

1. *Formica virescens*, *Fabr. Ent. Syst.* ii. p. 355. 23 ♂ ♀ ♀. *virescens*, *Fabr. Syst. Piez.* p. 417. 8.

2. *Formica gracilipes*, *Smith, Cat. Hym. Ins., Journ. Proc. Linn. Soc.* ii. p. 55. 13 ♂.

3. *FORMICA FRAGILIS*. *F. pallidè testacea, elongata et gracilis, capite posticè angustato; thorace medio compresso, pedibus elongatis; squamâ incrassatâ triangulatâ.*

Worker. Length $3\frac{1}{2}$ lines. Pale rufo-testaceous, smooth and slightly shining; antennæ elongate, longer than the body, the flagellum slender and filiform, the scape nearly as long as the head and thorax; head oblong, narrowed behind the eyes into a kind of neck, the sides parallel before the eyes, which are black and round, the clypeus slightly emarginate anteriorly, the mandibles finely serrated on their inner margin and terminating in a bent acute tooth. Thorax elongate, narrowest in the middle, the prothorax forming a neck anteriorly; legs elongate and very slender. Abdomen ovate, the node of the petiole incrassate, and viewed sideways is triangular or wedge-shaped.

Hab. Aru.

This is one of those remarkable forms which recede so greatly from the normal type of *Formica* as apparently to indicate a generic distinction; but in those exotic species of which we have obtained all the forms, we find many which approach closely to the present insect, which is probably only the small worker of some already described species. No one would venture, without the authority of the personal observation of some competent naturalist, to unite all the forms of any exotic species of *Formica*.

4. *FORMICA FLAVITARSUS*. *F. nigra, elongata et gracilis; thorace posticè compresso, pedibus elongatis, tarsis flavis.*

Worker. Length 4 lines. Black and sub-opaque; head elongate, narrowed behind, the clypeus truncate anteriorly, the mandibles pale ferruginous; antennæ elongate and slender, the flagellum filiform and pale rufo-testaceous; the thorax and legs elongate, the latter slender with their tarsi pale rufo-testaceous. Abdomen ovate, the scale of the petiole incrassate and slightly notched above.

Hab. Aru.

5. *FORMICA COXALIS*. *F. nigra, nitida; flagello, coxis et abdomine subtùs pallidè testaceis.*

Worker major. Length 5 lines. Black and very delicately roughened with a fine transverse waved striation only perceptible under a good magnifying power. Head large, much wider than the thorax, oblong-ovate with a deep emargination behind; the clypeus slightly produced and truncate anteriorly, the angles of the truncation rounded, and with a central shining carina; the flagellum, except the tarsal joint, pale rufo-testaceous. Thorax elongate, compressed behind, the coxæ pale rufo-testaceous. Abdomen ovate, the scale of the petiole incrassate, somewhat wedge-shaped when viewed sideways, the abdomen sparingly sprinkled with long pale hairs.

6. *FORMICA CORDATA*. *F. pallidè rufa*; abdomine fusco, capite cordato.

Worker. Length 2 lines. Pale rufo-testaceous; the head heart-shaped; the eyes black, the flagellum fusco-ferruginous with the basal joints pale; the mandibles ferruginous. Thorax narrow, deeply strangulated at the base of the metathorax. Abdomen more or less fuscous, the node of the petiole narrow and pointed above; the entire insect is smooth and shining.

Hab. Aru.

The *worker minor* is rather smaller and has the abdomen darker, in all the specimens received, but in other respects agrees with the above.

7. *FORMICA OCULATA*. *F. pallidè ferruginea*; capite oblongo, oculis magnis, thorace compresso.

Worker. Length $2\frac{1}{2}$ lines. Pale ferruginous, with the vertex and apex of the abdomen black; the head oblong, the sides nearly parallel, with the anterior margin truncate; the mandibles with fine acute teeth on their inner margin; the antennæ inserted wide apart about the middle of the head; the eyes very large and ovate, placed backwards on the sides of the head, reaching to the posterior margin of the vertex, forming as it were its posterior lateral angles. The thorax narrow and compressed behind; abdomen ovate, entirely smooth and shining.

Hab. Aru.

8. *FORMICA MUTILATA*. *F. nigra*; capite oblongo, truncato anticè et sanguineo, antennis tarsisque rufo-testaceis.

Worker. Length $2\frac{3}{4}$ lines. Black and shining; the head truncate anteriorly, the antennæ inserted wide apart, about the middle, the face blood-red before their insertion and deeply striated longitudinally, behind the antennæ the head is black, smooth, and shining; the eyes ovate and placed backwards on the sides of the head. Thorax rounded in front and strangulated between the meso- and metathorax, the latter obliquely truncate; legs rather short and stout, the femora compressed, the anterior pair broadly dilated, the base and apex of the femora, the tibiæ, and tarsi rufo-testaceous, the tibiæ with a darker stain behind. Abdomen oblong-ovate, the apical margins of the segments narrowly pale testaceous; the scale of the petiole compressed, with its superior margin rounded.

Hab. Aru.

This is a very singular insect in many respects, and closely resembles in form the *Formica truncata* of Spinola.

9. *FORMICA QUADRICEPS*. *F. nigra, nitida*; capite anticè obliquè truncato, thorace posticè compresso.

Worker. Length $3\frac{1}{4}$ lines. Shining black; head oblong-quadrate, slightly narrowed anteriorly, with the sides nearly straight, the posterior angles rounded, and very slightly emarginate behind; the head obliquely truncate from the base of the clypeus; the truncation

well as the mandibles obscurely ferruginous; the apex of the flagellum and the apical joints of the tarsi pale rufo-testaceous. Thorax rounded anteriorly, compressed behind, with the metathorax abruptly truncate. The scale of the petiole narrow, incrassate, its anterior margin slightly curved, its posterior margin straight; the abdomen ovate.

Worker minor. About 3 lines long, very like the larger *worker*, the head being truncate in front; but it is, in proportion to the thorax, narrower; the latter is compressed and abruptly truncate; in other respects it agrees with the *worker major*.

Hab. Aru.

10. *FORMICA LÆVISSIMA.* *F. nigra nitida lævissima*, sparsè pilosa; squamâ oblongâ subdepressâ.

Worker. Length 4 lines. Jet-black, very smooth and shining; head wider than the thorax, slightly emarginate behind, the sides slightly rounded; the anterior margin of the clypeus rounded, the mandibles striated and obscurely ferruginous; the scape with a few glittering silvery-white hairs. Thorax not quite so wide as the head anteriorly, narrowed behind, with the disk somewhat flattened, slightly convex, a deep strangulation between the meso- and metathorax, the latter obliquely rounded; the legs and abdomen sprinkled with glittering white hairs. The node of the petiole incrassate, very slightly elevated; viewed sideways, broadly wedge-shaped; the abdomen ovate.

Hab. Aru.

11. *FORMICA NITIDA.* *F. capite abdomineque nigris, antennis thoraceque pedibusque rufo-testaceis lævissimis et lucidis.*

Worker. Length 4 lines. Head and abdomen shining black; the flagellum, thorax, legs, and scale of the petiole rufo-testaceous; the legs palest; the scape fuscous, with its base pale; the head large, wider than the abdomen, and emarginate behind; the clypeus and mandibles obscurely ferruginous. Thorax compressed, not strangulated in the middle. The scale of the petiole narrow, with its margin rounded above; abdomen ovate, and sprinkled with a few erect pale hairs.

Hab. Aru.

12. *FORMICA SCRUTATOR.* *F. nigerrima, mandibulis tarsorumque articulo apicali pallidè ferrugineis, thorace medio profundè coarctato.*

Worker. Length $1\frac{1}{2}$ –2 lines. Shining black; the mandibles pale, ferruginous, with their inner margins finely denticulate; the eyes placed rather forwards on the sides of the head, the latter emarginate behind. Thorax deeply strangulated in the middle; the metathorax elevated and obliquely truncate behind. Abdomen ovate; the scale of the petiole sub-incrassate, with its margin rounded above; the insect very thinly covered with a fine cinereous pile.

Hab. Aru.

13. *FORMICA ANGULATA*. *F. nigra nitida*; flagello capite anticè pedibusque obscurè ferrugineis, metathorace angulato.

Worker. Length 3 lines. Shining black; head of moderate size; the clypeus and mandibles obscure ferruginous; the flagellum fusco-ferruginous, with the tip pale testaceous. Thorax rounded anteriorly and compressed behind; the scutellum prominent, forming a small tubercle; the metathorax obliquely truncate, the margin of the truncation elevated, so that when viewed sideways the metathorax forms an obtuse angular shape. Abdomen ovate, the node of the peduncle elevated, incrassate, rounded anteriorly, and flat behind.

Hab. Aru.

Gen. *POLYRHACHIS*, *Smith*.

1. *Formica sericata*, *Guér. Voy. Coq. Zool.* ii. 203; *Atlas Ins.* pl. 8. f. 2, 2 a, b, c, d, ♀. (*Polyrhachis sericata*, *Smith, Append. Cat. Form.* p. 200.)

Hab. Aru; New Hebrides.

2. *Formica sexspinosa*, *Latr. Hist. Nat. Fourm.* p. 126, pl. iv. f. 21 ♀. (*Polyrhachis sexspinosa*, *Smith, Cat. Form.* p. 56. 3.)

Hab. Aru; India; Philippine Islands.

3. *POLYRHACHIS MARGINATUS*. *P. niger*; antennis, palpis pedibusque ferrugineis; thoracis marginibus recurvis, metathorace petiolique squamulâ bidentatis.

Worker. Length 2½ lines. Black; the antennæ and legs ferruginous; the head and thorax rugose; the prothorax transverse, its anterior margin slightly curved, with the lateral angles produced forwards and very acute; the thorax narrowed to the metathorax, which is armed with two divergent acute spines. Abdomen velvety black and globose; the scale of the petiole produced laterally into long, bent, acute spines, which curve backwards to the shape of the abdomen.

Hab. Aru.

4. *POLYRHACHIS HOSTILIS*. *P. niger*, longitudinaliter striatus, thoracis marginibus expansis, metathorace squamulâque petioli spinis duabus crassis acutis curvatis.

Worker. Length 3 lines. Black; the head and thorax longitudinally striated, the abdomen very finely and evenly so; the prothorax transverse, wider than the head, the anterior and lateral margins recurved, the latter acute at their anterior angles, and rounded at the posterior ones; the lateral margins of the mesothorax recurved, a deep notch between the meso- and metathorax; the latter with a long, stout, curved, acute spine on each side. The scale of the petiole produced above on each side, into a long, curved, stout, acute spine, which curves backwards round the sides of the abdomen.

Hab. Aru.

5. *POLYRHACHIS LONGIPES*. *P. niger*; flagelli dimidio apicali tibisque anticis pallidè ferrugineis, prothorace petiolique squamulâ bidentatis.

Worker. Length 3 lines. Black; the head and thorax finely rugose; the antennæ elongate, longer than the insect; the apical half of the flagellum pale ferruginous. Thorax rounded above, the sides not margined; two spines on the thorax anteriorly, two on the metathorax, and two on the scale of the petiole; the legs elongate, with the anterior tibiæ ferruginous. Abdomen globose, sometimes rufous, or the base obscurely rufous.

Hab. Aru.

6. *POLYRHACHIS SERRATUS*. *P. niger*; capite thoraceque rugosis, abdomine densè punctato, squamâ petioli transversâ, margine superno serratâ.

Worker. Length 2 lines. Black, with the antennæ and legs ferruginous. Thorax oblong-quadrate or very slightly narrowed towards the metathorax, slightly convex above, not margined at the sides, the divisions not perceptible; the head and thorax rugose and pubescent. Abdomen globose, shining, and closely punctured; the scale of the petiole transverse above, produced into an acute spine on each side, the upper margin finely serrated, the lateral margins narrowed to their base, and having two or three small sharp spines.

Hab. Aru.

7. *POLYRHACHIS SCUTULATUS*. *P. niger*, fortiter politus et lucidus, metathorace petiolique squamulâ dente longo curvato acuto in latere utroque, pedibus nigro-ferrugineis.

Worker. Length $2\frac{3}{4}$ lines. Black and very smooth and shining; the legs dark ferruginous. Thorax: the disk expanded, slightly convex above, with the margins acute and curving upwards; the anterior margin transverse, rather wider than the head, with the lateral angles slightly curved forwards, and very acute; the lateral margins of the prothorax curved backwards and inwards; the margins of the mesothorax are rounded; the pro- and mesothorax highly polished above, forming an escutcheon-shaped disk; the metathorax opaque, and sprinkled with a few short glittering hairs, armed posteriorly with two long very acute spines, divergent and directed backwards. Abdomen globose; the scale of the petiole with two long curved acute spines, directed backwards to the curve of the abdomen.

Hab. Aru.

8. *POLYRHACHIS MUCRONATUS*. *P. lævis*, nitidus, niger; thorace spinis duabus crassis compressis acutis posticè armato.

Worker. Length $2\frac{1}{2}$ lines. Black, smooth, and shining, very delicately and indistinctly aciculate; the antennæ beneath and the tibiæ and femora obscurely ferruginous, the anterior and intermediate tibiæ brightest; the apex of the mandibles ferruginous. Thorax transverse

in front, or very slightly curved, with the lateral angles acute; the thorax is rounded above, and not margined at the sides; the metathorax armed with two long, stout, acute compressed spines; the spines divergent, as well as two on the scale of the petiole, which are long and very acute. Abdomen globose.

Hab. Aru.

9. *POLYRHACHIS GEOMETRICUS*. *P. niger*; antennarum apice, tibiis tarsorumque apice ferrugineis, thorace circulariter striato.

Worker. Length 2 lines. Black; the apical joints of the flagellum, the anterior legs, the anterior and intermediate tibiæ, and the apical joints of the tarsi pale ferruginous; the extreme base of the anterior tarsi black. Thorax rounded above, not margined, gradually narrowed posteriorly; the prothorax of the same width as the head, its lateral angles toothed; the disk with a circular striation. Abdomen globose and pubescent; the scale of the petiole compressed, its superior margin rounded, and with four minute teeth.

Hab. Aru.

10. *POLYRHACHIS IRRITABILIS*. *P. niger*, pube pallidè aureâ vestitus; thorace quadridentato, petioli squamulâ bidentatâ.

Female. Length $6\frac{1}{2}$ lines. Black, and densely clothed with short pale golden pubescence; all parts of the insect sprinkled with erect cinereous hairs; the mandibles shining black, the palpi pale testaceous; the head elongate, the eyes placed high on the sides of the head, ferruginous and very prominent. Thorax elongate-ovate; the prothorax with a short, stout, acute tooth on each side, slightly curved and directed forwards; the metathorax with a similar tooth on each side directed backwards; the wings subhyaline, the nervures fuscous; the legs fusco-ferruginous, the femora and coxæ brightest. Abdomen ovate; the scale incrassate, armed above with two stout acute teeth.

Hab. Aru.

This is probably the female of *P. sexspinosus*.

11. *POLYRHACHIS LÆVISSIMUS*. *P. niger*, lævis nitidusque; metathorace bispinoso, petioli squamulâ quadrispinosâ, pedibus ferrugineis.

Worker. Length $2\frac{1}{2}$ lines. Black, very smooth and shining; the legs ferruginous, with the coxæ, articulations, and the tarsi black. The thorax not flattened above, or margined at the sides; the division between the pro- and mesothorax distinct, that between the meso- and metathorax not discernible, the latter with two erect acute spines; the scale of the petiole with four short acute spines. Abdomen globose.

Hab. Aru.

This species is very like *P. mucronatus*; on close examination, however, it is seen to be very distinct: it may be at once distinguished by its larger head, which is wider than the thorax, rounded behind the eyes, and widely emarginate behind.

12. *POLYRHACHIS BELLICOSUS*. *P. capite abdomineque nigris, thorace femoribusque rufis, thorace quadrispinoso, petioli squamulâ bihamatâ.*

Worker. Length $3\frac{1}{2}$ lines. Black, with the scale of the petiole, thorax, coxæ, and femora blood-red. Thorax: the lateral margins raised above, with two slightly curved divergent spines in front, and two stout, acute, long curved spines in the middle, directed backwards; the scale of the petiole forming a long erect pedestal, which terminates above in two much bent acute hooks, directed backwards, and being as high as the basal segment of the abdomen; the spines and hooks black at the apex. Abdomen ovate.

Hab. Aru.

13. *POLYRHACHIS HECTOR*. *P. niger et vestitus pube pallidè aureâ; prothorace petiolique squamulâ bispinosâ, pedibus ferrugineis.*

Worker. Length 3 lines. Black; the apex of the scape and the legs ferruginous; the extreme base of the tibiæ and the tarai black; a stout acute spine on each side of the prothorax, directed forwards; the thorax flattened above, its lateral margins raised; the divisions of the segments very distinctly impressed; the pale golden pubescence on the abdomen thinner than on the head and thorax. The scale of the petiole angled at the sides towards its summit, the angles dentate, the upper margin straight, and at each lateral angle an acute spine, directed backwards, and curved to the shape of the abdomen; the spines parallel.

Hab. Aru.

14. *POLYRHACHIS RUFOFEMORATUS*. *P. niger, lævis, nitidus; femoribus abdominisque squamulâ ferrugineis.*

Worker. Length $3\frac{1}{2}$ lines. Black; head oblong; the eyes placed high at the sides near the vertex, the front very prominent, with two elevated carinæ in the middle, at the outside of which the antennæ are inserted. Thorax: the divisions strongly marked, flattened above with the sides elevated; the prothorax with an acute spine on each side anteriorly; the coxæ and femora ferruginous, with the apex of the latter more or less fuscous. Abdomen: the base and the scale ferruginous, the latter angled at the sides and emarginate above.

Hab. Aru.

Gen. *PONERA*, Latr.

1. *Ponera rugosa*, Smith, *Cat. Hym. Ins. Proc. Linn. Soc.* ii. 66. 5.

Hab. Aru. Borneo.

2. *PONERA SCULPTURATA*. *P. nitida nigra; capite, thorace abdominisque segmentis primo et secundo profundè striatis, nodo spinis duabus acutis armato; pedibus abdomineque apice ferrugineis.*

Worker. Length 5 lines. Black and shiny, the legs obscurely ferru-

ginous as well as the mandibles; the head strongly and evenly striated longitudinally. The prothorax with a circular striation above; behind, the thorax is compressed, the sides being obliquely striated, the striæ uniting and crossing the central ridge of the thorax. The node of the petiole and basal segment of the abdomen with a curved striation, the second segment longitudinally striated and depressed at its base, which is smooth and shining; the basal half of the third segment is longitudinally striated.

Hab. Aru.

This species is at first sight very like the *P. geometrica* from Singapore; but the striation of the abdomen alone will serve to distinguish it.

3. *PONERA PARALLELA*. *P. nigra*, opaca; antennis, mandibulis, pedibus abdominisque apice ferrugineis.

Worker. Length $3\frac{1}{2}$ lines. Opaque black; the antennæ thick and scarcely as long as the thorax, their apex and the mandibles bright ferruginous; the legs somewhat obscure ferruginous, with the articulations much brighter; the head a little wider than the thorax and subovate; the thorax, node of the petiole, and the abdomen of nearly equal width, the abdomen being slightly the widest; the node of the petiole nearly quadrate; the apical margin of the first segment and base of the second slightly depressed.

Hab. Aru.

4. *PONERA QUADRIDENTATA*. *P. atro-fusca*; antennis, facie anticæ, antennis, mandibulis, tibiis tarsisque ferrugineis; alis subhyalinis.

Female. Length $3\frac{1}{2}$ lines. Nigro-fuscous; the antennæ with a carina between their base, the face anteriorly, the mandibles, the legs, and the abdomen at its apex and beneath, ferruginous; the femora and coxæ above, fuscous; the head subquadrate with the angles rounded; the eyes small and placed forwards on the sides of the head towards the base of the mandibles, the latter with four strong teeth on their inner margin. Thorax oblong-ovate with the metathorax truncate; the wings fusco-hyaline, the stigma large and black. Abdomen: the second segment slightly narrowed at its base, the node of the petiole incrassate and compressed, its upper margin rounded. The insect entirely covered with a short downy cinereous pile, the abdomen having also a number of scattered erect glittering hairs.

Hab. Aru.

Gen. ECTATOMMA, *Smith*.

1. *ECTATOMMA RUGOSA*. *E. fusco-brunnea*; capite, thorace, nodoque rugosis; abdomine delicatè aciculato.

Worker. Length 4 lines. Obscure fusco-ferruginous, the antennæ and legs bright ferruginous; the head, thorax, and node of the petiole coarsely rugose; the eyes very prominent and glassy; the mandibles

longitudinally but very delicately striated, their inner margin oedentate; the thorax slightly narrowed behind. Abdomen very delicately aciculate.

Male. Length $3\frac{1}{2}$ lines. Of the same colour, and sculptured like the worker; the head rounded behind the eyes and narrowed before them; the eyes very large, prominent and ovate; the ocelli very bright and prominent; antennæ elongate and slender, the scape short, not longer than the second joint of the flagellum. Thorax: the scutellum prominent, forming a rounded tubercle, the metathorax elongate and oblique. Abdomen aciculate as in the worker, but much more deeply strangled between the first and second segments; the petiole rugose and clavate.

Hab. Aru.

Gen. ODONTOMACHUS, Latr.

1. *Odontomachus simillimus*, Smith, *Cat. Form.* p. 80. 11 ♀.

Hab. Aru. Ceylon.

2. *ODONTOMACHUS TYRANNICUS.* *O.* capite thoraceque nigris, antennis abdomineque ferrugineis, margine interno mandibulorum serratulo.

Worker. Length 7 lines. Head oblong, narrowed behind, posteriorly deeply emarginate; the mandibles rufo-piceous, brightest at their apex, which is armed with two long teeth which are bent abruptly inwards, their tips black; the anterior portion of the head striated obliquely from the centre; the head, behind the anterior sulcation, very smooth and shining and having a deep longitudinal central depression. Thorax transversely striated, the articulations of the legs and the tarsi ferruginous. Abdomen smooth, shining, and ferruginous; the node of the petiole incrassate, cylindric, and tapering upwards into a very acute spine.

Hab. Aru.

3. *ODONTOMACHUS MALIGNUS.* *O.* ferrugineus; capite supra oblique striato; margine interno mandibulorum confertim serrato; metathorace transversim striato; squamâ unispinosâ; abdomine lævissimo.

Worker. Length 7 lines. Ferruginous; the flagellum and legs palest; head much narrowed behind, the posterior margin deeply emarginate; mandibles smooth and shining, their inner margin strongly serrated, their apex abruptly bent or elbowed, and armed with two stout teeth; the face anteriorly evenly striated obliquely; the head behind the anterior sulcation very delicately striated obliquely. The prothorax smooth and shining, the meso- and metathorax transversely striated. Abdomen very smooth and shining; the node of the petiole incrassate and tapering upwards into an acute spine.

Hab. Aru.

This species most closely resembles *O. maxillaris* from Brazil; but its

smooth polished prothorax alone would distinguish it; its head is much broader anteriorly, and less elongate.

Gen. PSEUDOMYRMA, Guér.

1. PSEUDOMYRMA LÆVICEPS. *P. nigra*, lævis et nitida; antennis, mandibulis, tibiis anterioribus, tarsisque rufo-fulvis.

Worker. Length $2\frac{1}{2}$ lines. Black and shining; head very smooth and slightly emarginate behind, the eyes large and ovate; the mandibles and antennæ rufo-fulvous. Thorax with the sides flattened, the disk slightly convex; a deep strangulation between the meso- and meta-thorax, the latter rounded above and oblique behind; the trochanters, articulations of the legs, and the tarsi rufo-fulvous. Abdomen thinly covered with a fine cinereous pile; the first node of the petiole somewhat oblong-ovate, the second subglobose, the petiole of the first node short.

Hab. Aru.

Gen. PODOMYRMA, Smith.

Head oblong in the *female*, rather wider than the thorax; in the *worker* subovate and much wider; *eyes* small, ovate and placed about the middle at the sides of the head; *antennæ* geniculated, the scape about two thirds of the length of the flagellum which is clavate, the club three-jointed; the *mandibles* stout and dentate; the *labial palpi* 3-jointed; the *maxillary palpi* 4-jointed. *Thorax*, oblong-ovate in the *female*, in the *worker* transverse in front and narrowed behind with the metathorax bidentate; the anterior wings with one elongate marginal cell and two submarginal cells, the second extending to the apex of the wing; the legs stout, the femora incrassate; abdomen ovate, the peduncle with two nodes.

The insects included in this genus are undoubtedly most nearly allied to those belonging to the genus *Myrmecina*; but, excepting that they agree in having the same number of joints in the palpi, they have little resemblance to each other. With the exception of the genus *Myrmecia*, these are the largest insects in the subfamily Myrmicidæ; and all the species are distinguished by their remarkably thickened femora and margined thorax: we are unacquainted with the males.

1. PODOMYRMA FEMORATA. *P. ferruginea*; capite oblongo, obliquè striato, thorace abdomineque lævibus nitidis; alis subhyalinis fusconebulosis; femoribus valdè incrassatis, basi tenuissimis, femoribus posticis infra compressis.

Female. Length 8 lines. Rufo-testaceous; the mandibles and anterior margin of the face black, the inner margin of the mandibles rufo-piceous and armed with six short stout teeth, the apical tooth largest. The head oblong, slightly narrowed posteriorly and emarginate be-

hind, longitudinally striated, the striæ diverging from the centre at the anterior ocellus; at half the distance between the posterior ocelli and the margin of the vertex the striæ are transverse. Thorax smooth and shining, with scattered fulvous hairs; the wings fusco-hyaline, with a dark fuscous stain occupying the marginal cell and traversing the course of all the nervures; the legs with the femora much incrassated, the posterior pair compressed beneath into a flattened process or keel. Abdomen ovate, smooth, shining, and with a scattered fulvous pubescence; the first node of the petiole rounded in front, narrowed and truncate behind, with a large compressed tooth beneath; the second node subglobose.

Worker major. Length 4 lines. Ferruginous, entirely smooth and shining; the thorax, legs, and abdomen more or less obscure, the femora being usually rufo-piceous; the mandibles striated with their margins black. Thorax nearly flat above, very slightly convex with the sides margined, the anterior margin slightly rounded, the lateral angles produced into small acute spines; a deep strangulation at the base of the metathorax, a little before which the lateral margins are produced into an angular tooth, the metathorax with two short acute spines; the femora thickly incrassate. Abdomen ovate.

Hab. Aru.

2. *PODOMYRMA STRIATA.* *P. ferruginea*; capite thoraceque longitudinaliter striatis, femoribus valdè incrassatis, basi tenuissimis.

Worker. Length 3 lines. Rufo-ferruginous with the abdomen obscure, becoming blackish at the apex, the head coarsely striated, with a central portion from the insertion of the antennæ to the hinder margin of the vertex delicately so; the mandibles striated, with the teeth on their inner margin black. Thorax rugose-striate, the anterior lateral angles dentate, the metathorax without spines; the femora thickly incrassate and greatly attenuated at their base. Abdomen ovate, smooth and shining; the nodes of the petiole rugose.

Hab. Aru.

This species resembles *P. femorata*, but is easily distinguished by its striated head and thorax; the latter is similarly flattened above and margined at the sides; the femora are also thickened precisely as in that species.

3. *PODOMYRMA LÆVIFRONS.* *P. obscurè ferruginea*; capite abdomineque lævissimis lucidisque; thorace longitudinaliter striato; femoribus medio valdè incrassatis, basi tenuissimis.

Worker. Length 2½ lines. Head and abdomen smooth, shining black, in some examples fusco-ferruginous; the antennæ, legs, and thorax ferruginous, the latter longitudinally striated; the thorax margined at the sides, the disk slightly convex, the anterior margin slightly rounded, with the lateral angles armed with short acute spines, the

thorax deeply strangled posteriorly, the metathorax not spined; the femora thickly swollen in the middle and very slender at their base and apex. Abdomen ovate, the first node of the petiole oblong, the second globose.

Hab. Aru.

There is considerable variation in intensity of colouring in examples of this species, the thorax and legs being sometimes pale ferruginous; in the specimen described they are dark; every shade of gradation occurs in different individuals.

4. *PODOMYRMA BASALIS*. *P. fusco-ferruginea*; abdominis basi pallide testacea; femoribus medio incrassatis, basi tenuibus.

Worker. Length 3 lines. Obscurely ferruginous, the scape of the antennæ, the base of the femora and the tibiæ pale ferruginous; the base of the abdomen pale testaceous; the head and thorax with deep coarse longitudinal furrows; the flagellum blackish-brown towards its apex, with the extreme tip pale. Thorax: the anterior margin slightly rounded with the lateral angles very acute; the femora very thickly incrassate in the middle; the apex of the tibiæ ferruginous. Abdomen smooth and shining; the basal half pale testaceous, the apical half and the following segments black; the nodes of the petiole rugose; the first node elongate, with a short acute tooth at the base above, and a blunt one beneath.

Hab. Aru.

Gen. *MYRMICA*, Latr.

1. *MYRMICA PARALLELA*. *M. rufo-fulva*; antennis pedibusque pallide testaceis; abdomine fusco-ferrugineo; capite thoraceque longitudinaliter striatis.

Worker. Length 1 line. Head and thorax ferruginous and longitudinally and evenly striated; antennæ and legs pale rufo-testaceous. Thorax margined at the sides, the disk slightly convex, the anterior margin transverse, the lateral angles acute; the metathorax with two short spines; abdomen dark fusco-ferruginous, the nodes of the petiole subrugose; club of the antennæ 3-jointed.

Hab. Aru.

2. *MYRMICA SCABROSA*. *M. nigra*; capite thoraceque scabrosis, metathorace bispinoso, abdomine ovato levi.

Worker. Length 1 line. Black; the head, thorax, and nodes of the petiole roughened; the mandibles, flagellum and tarsi rufo-testaceous; the lateral angles of the prothorax acute, the sides narrowed slightly to the base of the metathorax, the spines on the latter acute; nodes of the petiole globose. Abdomen ovate, smooth and shining; club of the antennæ 3-jointed.

Hab. Aru.

3. *MYRMICA THORACICA*. *M. capite abdomineque nigris; antennis, mandibulis thorace pedibusque flavis.*

Worker. Length $\frac{3}{4}$ line. Head and abdomen jet-black; the antennæ, thorax, and legs of a clear honey-yellow; the mandibles of a more obscure yellow; the anterior margin of the thorax transverse, the lateral angles acute, narrowed from thence to the base of the mesothorax, the disk anteriorly slightly convex; the metathorax armed with two acute spines. Abdomen nearly round, and very smooth and shining; the first node of the petiole vertical anteriorly, and gradually rounded behind, the second node transverse, its anterior margin straight, the angles rounded, the sides narrowed towards the abdomen; the club of the antennæ 3-jointed.

Hab. Aru.

The singular form of the thorax of this species, as well as the construction of the nodes of the petiole, appear to indicate an uncharacterized division of the genus *Myrmica*.

4. *MYRMICA SUSPICIOSA*. *M. rufo-testacea, lævis, tota nitidissima nuda; mandibulis, antennis, pedum articulationibus tarsisque pallescentibus; metathoracis spinis minutissimis.*

Worker. Length 1 line. Rufo-testaceous and very smooth and shining; the antennæ as long as the insect; the flagellum, mandibles, tarsi, and articulations of the legs pale testaceous. The thorax narrowed anteriorly into a short neck, behind which it is dilated, the sides being rounded, the meso- and metathorax narrower and of nearly equal width, the spines of the metathorax minute and slender. The first node of the petiole somewhat wedge-shaped, the second globose, the abdomen very smooth and shining; club of the antennæ 3-jointed.

Hab. Aru.

I can detect no specific difference between this and *Myrmica levigata*, taken by myself in the neighbourhood of London; but it is not uncommonly met with in hothouses, near to which I captured my specimen. I believe *M. levigata* is identical with *Ecopkhora pusilla*, the House-Ant of Madeira.

5. *MYRMICA MELLEÆ*. *M. capite thoraceque flavis; abdomine pallidè fusco.*

Worker. Length $1\frac{1}{4}$ line. Head, antennæ, thorax, and legs honey-yellow and very smooth and shining; thorax strangulated at the base of the metathorax, which is not spined; the first node of the abdomen is oblique anteriorly, and vertical behind, the second node subglobose. Abdomen: the base honey-yellow, the apical margin of the first segment, and the following segments entirely, pale fuscous; the club of the antennæ 2-jointed.

Hab. Aru.

6. *MYRMICA CABINATA*. *M. obscurè fusco-ferruginea; thorace rufo-*

fulvo; capite thoraceque carinis irregularibus; metathorace spinis duabus longis armato.

Worker. Length $1\frac{1}{2}$ lines. Head and abdomen black, with more or less of an obscure ferruginous tinge, particularly at the vertex and base of the abdomen; the thorax and nodes of the petiole ferruginous; the legs rufo-piceous, with the tarsi and articulations ferruginous, the antennæ and mandibles ferruginous; the head and thorax with irregular distant longitudinal carinæ; the sides of the thorax rugose; the spines on the metathorax long and acute; the abdomen very smooth and shining; the club of the antennæ 3-jointed.

Hab. Aru.

Gen. CREMATOGASTER, *Lund.*

1. *Crematogaster obscura*, *Smith, Cat. Hym. Ins., Journ. Proc. Linn. Soc.* ii. 76. 4 ♂.

Hab. Aru; Borneo.

2. *CREMATOGASTER ELEGANS*. *C. pallidè rufo-testaceus*; abdomine nigerrimo nitido; thorace bispinoso.

Worker. Length $\frac{3}{4}$ line. Entirely pale rufo-testaceous, excepting the eyes and abdomen which are jet black; the nodes of the petiole pale, smooth, and shining. Head about the same width as the abdomen. The lateral angles of the anterior margin of the prothorax acute, the metathorax armed with two long acute spines. Abdomen heart-shaped, its apex acute.

Hab. Aru.

3. *CREMATOGASTER INSULARIS*. *C. niger, lævis et nitidus*; antennis tarsisque pallidè testaceis; thorace spinis duabus acutis armato.

Worker. Length $1\frac{1}{2}$ line. Black, smooth and shining; the vertex, thorax and nodes of the peduncle with an obscure ferruginous tinge; the antennæ, tarsi, and articulations of the legs pale rufo-testaceous; the spines which arm the metathorax stout, elongate, and acute, with their apex pale testaceous. Abdomen heart-shaped and very acute at the apex.

Hab. Aru.

Gen. SOLENOPSIS, *Westw.*

1. *SOLENOPSIS CEPHALOTES*. *S. pallidè ferruginea*; capite maximè in medio sulcato, abdomine apice fusco.

Worker major. Length $2\frac{1}{2}$ lines. Pale ferruginous, with the anterior part of the face darker, the mandibles incrassate and very dark fusco-ferruginous; head very large and divided by a deep longitudinal channel, emarginate behind, nearly quadrate; the eyes small and placed forwards on the sides of the head. The metathorax truncate, not spined. Abdomen ovate, truncate at the base, its apex fuscous; the first node of the petiole compressed, its margin rounded above

the second node incrassate and subglobose; club of the antennæ 2-jointed.

Worker minor. Length $1\frac{1}{2}$ line. Of the same colour as the *worker major*, but with the head of the ordinary size and slightly narrowed behind, the mandibles of the same colour as the head; the legs and antennæ longer, as well as the petiole of the abdomen; the body is very smooth and shining, the club of the antennæ 2-jointed.

Hab. Aru.

Subfam. CRYPTOCERIDÆ, *Smith.*

Gen. MERANOPLUS, *Smith.*

1. MERANOPLUS SPINOSUS. *M. castaneo-rufus*; abdomine nigro, thorace sexspinoso; abdomine ovato.

Worker. Length $1\frac{1}{2}$ line. Head and thorax rugose; the antennæ and tarsi rufo-testaceous; the eyes rather prominent, the groove above them at the sides of the head extending backwards to the vertex. Thorax: the anterior margin curved forwards, the lateral angles produced into a bifurcate process on each side, behind the processes, slightly narrowed to the base of a long curved tooth; the posterior margin emarginate with a long sharp spine at each angle of the emargination; the node of the petiole globose. Abdomen black, smooth and shining.

Hab. Aru.

Fam. MUTILLIDÆ, *Leach.*

Gen. MUTILLA, *Linn.*

1. *Mutilla Sibylla*, *Smith, Proc. Linn. Soc. ii. 86, 11 ♀.*

Hab. Aru; Borneo; Celebes.

2. MUTILLA MANIFESTA. *M. capite abdomineque nigris, thorace sanguineo-rubro, maris alis nigro-fuscis.*

Female. Length $4\frac{1}{2}$ lines. Head black and rugose. The thorax blood-red and coarsely rugose, its anterior margin widest and straight, the sides gradually narrowed to the apex in a slight curve; the lateral margins have two teeth not wide apart. Abdomen black, rugose, and slightly shining, with black pubescence above; on the under surface it is glittering silvery-white; the legs and sides of the thorax have a similar pubescence.

Male. The same size as the female, and the same colour; the eyes notched. The thorax oblong-quadrate, the posterior lateral angles acute; the tegulæ large and red; the wings dark brown, with their extreme base hyaline. Abdomen shining black, the first and second segments strongly punctured, the rest much more finely and not very closely so.

Hab. Aru.

MUTILLA CARINATA. *M. capite thoraceque metallico-purpureis*

viridi tinctis, pedibus ferrugineis, abdomine nigro, basi pallido fasciatâ, segmento secundo ad apicem fasciâ bilobatâ ornato.

Female. Length $4\frac{1}{2}$ lines. The head and thorax of a metallic purple tint with shades of green and copper; the scape of the antennæ, the mandibles, palpi, and legs ferruginous; the head and thorax closely and strongly punctured. The abdomen velvety black; the base truncate, the truncation smooth and shining; its margin carinate; the upper surface of the basal segment yellowish-white, a broad bilobed fascia of the same colour at the apical margin of the second segment; the apex ferruginous. *Male.* The head and thorax metallic green, strongly and closely punctured; abdomen black and shining, much more finely punctured than the thorax; wings light brown, with their base and extreme apex hyaline; the legs ferruginous.

Hab. Aru.

4. *MUTILLA NIGRA.* *M. nigra et punctata, abdomine lævi et nitido, delicatulâ punctato, alis fuscis, basi hyalinis.*

Male. Length $6\frac{1}{2}$ lines. Black; head and thorax closely and strongly punctured; the eyes slightly notched; the face with silvery-white pubescence, the mandibles shining, the palpi black. Thorax: the metathorax densely clothed with yellowish-white pubescence; the legs with glittering white hairs, the calcaria white; wings brown with their base hyaline. Abdomen smooth and shining, delicately and sparingly punctured, with a few silvery hairs at the sides.

Hab. Aru.

5. *MUTILLA EXILIS.* *M. nigra et punctata; abdomine lævigato, nitido; alis subhyalinis; facie et metathorace pube argentatâ vestitis.*

Male. Length $6\frac{1}{2}$ lines. Black; head and thorax strongly punctured; the eyes emarginate, the face with glittering silvery-white pubescence, the cheek thinly sprinkled with silvery hairs; the palpi testaceous. Thorax: the metathorax densely clothed with silvery pubescence, beneath, at the sides, and also the legs with scattered silvery hairs, the calcaria white; the tegulæ shining; the wings subhyaline with the nervures dark fuscous. Abdomen shining black, smooth, and very delicately and sparingly punctured, the apical margins of the segments very thinly fringed with glittering silvery hairs.

Hab. Aru.

Tribe FOSSORES, *Latr.*

Fam. SCOLIADÆ, *Leach.*

Gen. MYZINE.

1. *MYZINE TENUICORNIS.* *M. nigra, alis hyalinis, abdomine nitido flavoque variegato.*

Male. Length 7 lines. Black; the head and thorax very closely punctured, thinly clothed with griseous pubescence, that on the face, tho'

beneath, and on the coxæ most dense and glittering; antennæ more slender than is usual in this genus, and tapering to their apex, the joints slightly subarcuate; the mandibles bidentate at their apex and with a yellow spot at their base. Thorax: the posterior margin of the prothorax, a spot beneath the wings, the tegulæ, and the post-scutellum yellow; the anterior and intermediate tibiæ ferruginous and more or less dusky above, the posterior pair ferruginous beneath. Abdomen shining, the margins of the segments deeply depressed; a small ovate spot on each side of the first segment, the second and three following segments with a narrow stripe on each side in the middle, yellow; the yellow markings obscure; the apical segment coarsely rugose; beneath, the segments are closely and strongly punctured.

Hab. Aru.

Gen. *SCOLIA*, *Fabr.*

Division I. The anterior wings with two submarginal cells and two recurrent nervures.

1. *Scolia grossa*, *Burm. Abh. Nat. Ges. Halle*, i. p. 23. (*Tiphia grossa*, *Fabr. Syst. Piez.* p. 232. 4.)

Hab. Aru; Java.

The specimens of this species received from Aru are only 9 lines in length; I have examined others from Celebes, Borneo, India, and Java, showing every difference between 9 lines and 18 lines.

Division II. Anterior wings with two submarginal cells and one recurrent nervure.

2. *SCOLIA NITIDA*. *S. nitida*, *atterima*; *alis aeneo et violaceo splendide micantibus*.

Female. Length 11 lines. Shining jet-black, the abdomen with prismatic tints. The flagellum fusco-ferruginous beneath, the mandibles ferruginous at their apex; the wings dark brown with a splendid lustre of coppery and golden tints mixed with shades of violet. The head with a few punctures behind the ocelli; the thorax with scattered punctures; the metathorax finely but not closely punctured; the disk of the mesothorax impunctate; the abdomen with fine scattered punctures; the apical segment opaque, rugose, and with its apical margin pale testaceous; the abdomen beneath with strong distant punctures.

Hab. Aru.

3. *SCOLIA FULGIDIPENNIS*. *S. nitida*, *nigra*; *abdomine prismatico, alis fuscis viride et violaceo micantibus*.

Female. Length 12-13 lines. Jet-black, shining; head very smooth, the hinder margin of the vertex finely punctured, the face with a few fine scattered punctures; the flagellum obscurely rufo-fuscous. Thorax finely punctured, the disk of the mesothorax impunctate; wings dark brown with a splendid green iridescence, with violet tints to-

wards their base; the legs thickly spinose and pubescent; the calcaria simple. Abdomen with scattered fine punctures; the apical segment densely clothed with black pubescence; beneath, with strong scattered punctures.

Male. Rather smaller than the female, much more closely punctured, and not so shining and smooth; the face with a transverse arched carina above the insertion of the antennæ, which enters the emargination of the eyes; the clypeus strongly punctured; in other respects resembling the female.

Hab. Aru.

This species belongs to Guérin's division *Liacos*, of which *S. dimidiata* is the type; the third discoidal cell is petiolated, the petiole entering the second submarginal about the middle.

4. *SCOLIA INSULARIS.* *S. nitida nigra*; abdomine prismatico, alis obscurè fuscis cupreo submicantibus.

Male. Length 7-9 lines. Shining black; head punctured, the vertex most finely and distinctly so. Thorax punctured, the disk of the mesothorax impunctate, the punctures wide apart on the scutellum and metathorax; the wings dark brown with a coppery iridescence, which has a remarkable dimness as if breathed upon. The basal segment of the abdomen strongly and closely punctured; the following segments more finely and distantly punctured, particularly the second and third segments.

Hab. Key Island.

5. *SCOLIA QUADRICEPS.* *S. nitida nigra*; foeminae capite magno subquadrato, alis fuscis cupreo iridescentibus.

Female. Length 6-8 lines. Black and shining; head subquadrate, smooth and shining, as wide as the thorax, with a few punctures at the sides of the face and between the antennæ. Thorax finely punctured, with the disk of the mesothorax impunctate; wings dark brown with a rich coppery iridescence. Abdomen with a fine prismatic lustre, closely and strongly punctured towards the apex and at the extreme base, the second segment and the middle of the third with only a few very fine scattered punctures.

Hab. Aru.

This species also belongs to the division *Liacos*; the petiolated cell is small and oblong-quadrate; the male exactly resembles the female, except that its head is smaller and narrower than the thorax; the abdomen is rather more strongly punctured.

Gen. POMPILUS, *Fabr.*

1. *POMPILUS DUBIUS.* *P. niger*, pilis mutabili-sericeis tectus; alis subhyalinis, apice nebuloso.

Female. Length 4½ lines. Black and covered with a thin changeable silvery pile, which is most dense on the sides of the metathorax and base of the segments of the abdomen. The vertex emarginate behind, the eyes very large, their inner orbits emarginate, reaching high on

the sides of the head nearly to the margin of the vertex; the clypeus emarginate in front, the labrum produced. Thorax: the prothorax subelongate, narrowed anteriorly; the wings subhyaline, their apex clouded; the intermediate and posterior tibiae with a double row of spines; all the tarsi simple; the calcaria stout and elongate. Abdomen shining, with the margins of the segments slightly depressed.

Hab. Aru.

Subgen. *AGENIA*, *Schödt.*

1. *AGENIA blanda*, *Guér. Voy. Coq. Zool.* pt. 2. ii. p. 260.

Hab. Celebes; India; Singapore; Malacca; Borneo; Key Island.

2. *AGENIA CALLISTO*. *A. nigra*, pilis sericeis vestita; facie thoraceque subtus pube argentato-albâ densè vestitis; alis fasciis duabus angustis.

Female. Length 8 lines. Black; the face, clypeus, and cheeks with a dense silvery-white pile; the tips of the mandibles obscurely ferruginous, the palpi black. Thorax with a brilliant silvery-white pile on the sides, beneath, and on the coxæ; the metathorax transversely rugose; the wings hyaline; the anterior pair with a narrow fuscous fascia at the apex of the externo-medial cell, and a second rather broader at the base of the marginal cell, which does not quite cross the wing; the apex of the wing fuscous. Abdomen petiolated, smooth and shining, with a beautiful glossy pile, which is most dense at the sides; the apical segment longitudinally subcarinated in the middle above.

Hab. Aru.

3. *AGENIA JUCUNDA*. *A. nitida nigra*; facie metathorace abdomineque pube sericeâ vestitis; antennis, pedibus, abdominisque marginibus apicalibus ferrugineis; alis hyalinis.

Female. Length 5½ lines. Black; head, pro- and mesothorax, as well as the scutellum, glassy-smooth and shining; the face covered with silvery-white pile; the antennæ, tips of the mandibles, and the legs ferruginous; the palpi elongate and pale rufo-testaceous. Thorax: the wings hyaline and iridescent, the nervures very slender and pale rufo-testaceous, the stigma fuscous; the metathorax rounded behind, transversely rugose, and covered with silvery-white pile. Abdomen petiolated; the apical margins of the second and following segments ferruginous, the apical segment entirely so; the ferruginous band on each segment produced in the middle into an angular shape; on the abdomen beneath they are similarly produced; the basal segment entirely ferruginous, with a black spot on each side.

Hab. Aru.

4. *AGENIA ALTHEA*. *A. nigra*; facie pube argentato-albâ vestitâ, thorace abdomineque sericeo pubescentibus; alis hyalinis, venis nigris.

Female. Length 5 lines. Black; the face silvery; the anterior margin of the clypeus rounded and narrowly smooth and shining; tips of the mandibles ferruginous; the mandibles elongate and pale rufo-testaceous. Thorax: the metathorax finely transversely rugose, the sides with bright silvery-white pubescence; the coxæ, the thorax beneath and on the sides, with fine silky sericeous pile; the anterior tibiæ and tarsi, and all the femora at their apex beneath, ferruginous; wings hyaline and iridescent, nervures black; the outer margin of the tegulæ testaceous. Abdomen shining, and with a fine silvery sericeous pile; the apical margins of the segments narrowly rufo-piceous; the terminal segment with an elongate, smooth, shining space, which extends to the apex, which is testaceous.

Hab. Aru.

5. *AGENIA ALCYONE.* *A. nigra*, pilis sericeis cinereis vestita; antennis pedibusque ferrugineis, alis hyalinis; abdomine petiolato; marginibus apicalibus segmentorum flavis.

Male. Length 7 lines. Black; the antennæ, tips of the mandibles, and the legs ferruginous; the scape in front, a narrow line on the inner orbit of the eyes, and the anterior portion of the clypeus yellow; the antennæ fuscous above towards their base. Thorax: the femora beneath towards their base, the trochanters and coxæ, except their apex, black; the apical joints of the intermediate and posterior tarsi fuscous; wings hyaline, the nervures fusco-ferruginous, the tegulæ reddish-yellow. Abdomen petiolated; the apical margins of the segments with reddish-yellow fasciæ; beneath, the margins of the segments are rufo-piceous, not fasciated.

Hab. Aru.

6. *AGENIA AMALTHEA.* *A. nigra*, pilis tenuibus cinereis sericeis vestita; antennis anticè pedibusque anticis et intermediis anticè ferrugineis; abdomine petiolato; alis hyalinis bifasciatis.

Female. Length 6 lines. Black; the face densely covered with silvery pile; the antennæ in front, the anterior margin of the clypeus and the tips of the mandibles ferruginous; palpi elongate and pale rufo-testaceous. Thorax: the posterior margin of the prothorax narrowly, the tegulæ, the anterior and intermediate femora in front, the posterior pair towards their apex beneath, the anterior tibiæ and tarsi, the intermediate and posterior tibiæ more or less beneath, and their tarsi, ferruginous; the tarsi sometimes dusky above; the wings hyaline, a narrow fuscous fascia at the apex of the externo-medial cell, and a broad one crossing at, and being the width of, the second and third submarginal cells; tips of the wings milky-white; the metathorax rounded posteriorly, transversely finely rugose and densely covered with short silvery-white pubescence at the sides and apex. Abdomen petiolated, smooth and shining, with the apex and the margins of the segments narrowly rufo-piceous.

Hab. Aru.

Gen. *PRIOCNEMIS*, *Schödte*.

1. *PRIOCNEMIS PULCHERRIMUS*. *P. lætè ruber*; alis flavo-hyalinis, apice latè fusco, abdominis lateribus nigris.

Female. Length $7\frac{1}{2}$ lines. Bright red; the anterior margin of the clypeus with a minute tooth in the centre; the tips of the mandibles fuscous. The metathorax slightly striated transversely, and with a central as well as a lateral longitudinal groove; the wings flavo-hyaline, their apex with a fuscous cloud, which commences at the base of the first discoidal cell, the extreme tips pale; the tibiæ and tarsi with short slender spines; the extreme apex of the joints of the posterior tarsi black. Abdomen: the short petiole of the basal segment, and the sides of the second, third, and fourth segments black, leaving a red line down the middle of each; beneath, the second, third, and base of the fourth segments black.

Hab. Aru.

2. *PRIOCNEMIS FERVIDUS*. *P. capite, antennis, thorace pedibusque ferrugineis*; abdomine nigro; alis fuscis basi subhyalinis.

Female. Length 9 lines. Ferruginous, with the abdomen black; the anterior margin of the clypeus rounded. The metathorax transversely rugose; the pectus, and coxæ at their base within, black; wings brown, with a violet iridescence, their base rufo-hyaline; the intermediate and posterior tibiæ with a double row of spines, all the tarsi spinose. Abdomen shining black, with the extreme apex slightly ferruginous.

Hab. Aru.

Gen. *MACROMERIS*, *St.-Farg.*

1. *MACROMERIS IRIDIPENNIS*. *M. cæruleo-nigra*; abdomine iridescente, alis cæruleo-violaceoque splendide micantibus; pedibus muticis, simplicibus.

Female. Length 12 lines. Blue-black; abdomen with a changeable iridescent pile; head and thorax with a black velvety pubescence; the metathorax very finely rugose and opaque; the legs simple; the posterior tibiæ villose within; the wings very dark brown, with a splendid violet and blue iridescence.

Male. Very closely resembling the female, but rather smaller; the anterior and intermediate femora more incrassate, and all the femora with a simple row of teeth or serrations on their inferior margins.

Hab. Aru.

Although this species of *Macromeris* is very similar in colour to the *M. violacea* of St.-Fargeau, the femora are not so thick as in that species, not in fact much more so than in the female; and the row of teeth beneath is a strong specific character.

Gen. *SALIUS*, *Fabr.*

1. *SALIUS MALIGNUS*. *S. niger*, pube cinereâ sericeâ vestitus; alis fuscis, albo fasciatis.

Female. Length 9 lines. Black, and covered with a fine thin ashy pile; the scape in front, and the anterior margin of the clypeus narrowly, obscure yellow; the mandibles ferruginous at their apex, which has a single notch; the palpi pale rufo-testaceous. Thorax: the prothorax with a slightly interrupted narrow fascia a little before its posterior margin, and the scutellum, yellow; the anterior femora broadly dilated, and, as well as the anterior tibiæ, ferruginous within; the intermediate tibiæ ferruginous at their apex in front, and the posterior pair with a yellowish-white spot at their base outside; the calcaria pale testaceous, the claws ferruginous, the anterior tarsi entirely so, but more or less obscure; the posterior tibiæ slightly spinose; the anterior wings brown, with a white fascia crossing at the first discoidal cell, and a second at the apex of the third submarginal, the extreme base and the anterior margin of the externo-medial cell hyaline. Abdomen: the apical margins of the segments with a little bright silvery pile.

Hab. Aru.

Gen. *MYGNIMIA*, *Smith.*

1. *MYGNIMIA ASPASIA*. *M. cæruleo-nigra*; capite thoraceque pube holosericeâ vestitis; alis fulvo-hyalinis; abdomine pilis iridescentibus vestito.

Female. Length 14 lines. Black, with shades of blue in certain lights; the abdomen with bright tints of blue and violet, caused by fine iridescent changeable pile; the legs have a similar pile, very bright on the femora within; the head and thorax with a short black velvety pubescence; the wings flavo-hyaline; the nervures pale ferruginous; the extreme base of the wings blackish, their apical margins with a narrow fuscous border. The legs spinose; the posterior tibiæ with a double row of strong serrations.

Gen. *SPHEX*, *Fabr.*

1. *SPHEX ARGENTATA*, *Dahlb. Hym. Eur. i. 25. 1.*

Hab. Aru; Celebes; Sumatra; India; Greece; Africa; East Florida.

2. *SPHEX SERICEA*, *Fabr. Syst. Piez. 211. 19.*

Hab. Aru; Malacca; Borneo; Java; Philippine Islands.

3. *SPHEX AURIFRONS*. *S. niger*; facie pube aureâ vestitâ, alis flavo-hyalinis apice fuscis, abdomine pilis sericeo-aureis vestito.

Female. Black; the face densely clothed with golden pubescence, the head having a number of scattered long golden-yellow hairs. Thorax

thinly covered with long yellow pubescence, which is most dense at the sides of the metathorax; the tibiæ, tarsi, and posterior femora ferruginous; the claw-joint of the tarsi black; the tibiæ and tarsi with black spines; the wings fulvo-hyaline, their apex with a narrow fuscous border, the nervures ferruginous. Abdomen covered with a fine, thin, golden-reflecting pile; the apical margins of the segments rufo-testaceous, the testaceous margin produced in the middle into a triangular shape, most conspicuously so on the segments beneath.

Hab. Aru.

4. *SPHEX NITIDIVENTRIS*. *S. niger*; abdomine nigro-ceruleo, lævigato, nitido; alis fuscis.

Female. Length 12 lines. Black; the face with silvery pubescence, and thinly covered with long black hairs; the clypeus with a central longitudinal carina at the base, which terminates at the middle, from whence to the anterior margin is a broad, smooth, shining space. Thorax shining and finely punctured; the metathorax opaque and covered with long, loose, black pubescence; the legs shining, the posterior tibiæ with shining grey pile within; wings brown, darkest at their base. Abdomen blue, and very smooth and shining, oblong-ovate; the apical segment vertical.

Hab. Aru.

5. *SPHEX SEPICOLA*. *S. niger*; facie pube aureâ vestitâ; alis subhyalinis apice fuscis; abdomine nitido.

Female. Length 9 lines. Black; the face densely clothed with golden pubescence, the cheeks with iridescent pile, with a long, loose, scattered pale yellow pubescence on the head and thorax; the mandibles smooth, shining black. The disk of the thorax with an obscure chalybeous tint, shining and finely punctured; the metathorax opaque and finely rugose; the wings subhyaline, their apical margins fuscous, the nervures fusco-ferruginous. Abdomen with a slender subelongate petiole, and with a thin, silky, grey pile; the apical margins of the segments narrowly and obscurely rufo-piceous.

Male. Rather smaller than the female, more slender and more pubescent, the pubescence on the face paler.

Hab. Aru.

6. *SPHEX GRATIOSA*. *S. capite thoraceque nigris, abdomine ceruleo, alis fusco-hyalinis.*

Male. Length 10 lines. Head and thorax black; the face densely clothed with pale golden pubescence; the labrum and mandibles highly polished, very smooth and shining; a thin pale pubescence is scattered over the head, pro- and mesothorax, the latter obscurely chalybeous above, shining, and finely and closely punctured, with an abbreviated, deeply impressed line in the middle anteriorly; the posterior margin of the prothorax covered with shining silvery pubescence; the

metathorax opaque, and clothed with black pubescence; wings fusco-hyaline, the anterior pair darkest towards their base, the nervures dark fusco-ferruginous, nearly black. Abdomen smooth, shining dark blue; beneath, the margins of the segments have a bright, glittering, pale-golden pile.

Gen. *PELOPÆUS*, Latr.

1. *PELOPÆUS LABORIOSUS*. *P. niger*; scapo anticè, pedibus petioloque rufescenti-flavis, alis hyalinis fulvo tinctis.

Female. Length 12 lines. Black, with black pubescence on the head and thorax; the face with a fine cinereous pile; the scape yellow in front; the mandibles smooth and shining. Thorax: the legs pale ferruginous, the posterior femora darkest; the coxæ, the anterior and intermediate trochanters, and base of the femora black; wings fulvo-hyaline, the nervures ferruginous; the metathorax obliquely striated. Abdomen slightly shining at the base, with the petiole reddish-yellow.

Hab. Aru.

Gen. *LARRADA*, Smith.

1. *LARRADA MODESTA*. *L. nigra*; abdomine pilis argentatis fasciato; alis hyalinis.

Female. Length $6\frac{1}{2}$ lines. Black; the face covered with silvery down; the mandibles smooth, shining, black, and fringed beneath with fulvous hairs, the cheeks silvery. Thorax slightly shining, closely and delicately punctured; the metathorax opaque and transversely striated; wings subhyaline, with a fuscous border at their apex, the nervures black. Abdomen slightly shining; the apical margins of the first, second, and third segments with fascia of silvery pile, which is very brilliant in certain lights.

Male closely resembles the female, but has an additional fascia on the abdomen.

Hab. Aru.

Gen. *LARRA*, Fabr.

1. *LARRA SIMILLIMA*. *L. nigra*, pulchre prismatica, maculis fascisque variis flavis ornata.

Female. Length $6\frac{1}{2}$ lines. Black; the abdomen with tints of blue violet; the thorax slightly prismatic; the labrum, clypeus, an angular scape above, an abbreviated line on the inner orbits of the eyes, the scape in front, and the antennæ beneath, yellow; the cheeks with a silvery reflexion. The thorax beneath, and the metathorax, with a shining white silvery pile; the anterior and intermediate femora and tibiae beneath yellow; the tarsi pale ferruginous, and more or less fuscous above; wings subhyaline, the nervures fuscous; a spot on the lateral posterior angles of the metathorax, two ovate spots on the scutellum, and a line on the postscutellum yellow. Abdomen: the basal segment with a broadly interrupted fascia a little before its

apical margin; the second and fourth segments with a narrow yellow fascia at their apical margins, which is widened laterally; beneath, the second and third segments with a yellow spot on each side.

The *Male* differs from the female in having a large quadrate black spot on the clypeus, and a spot at the base of the labrum; there is also a narrow yellow line on the posterior margin of the prothorax; and the third segment of the abdomen has a yellow fascia: it is also rather smaller.

Hab. Aru.

This insect very closely resembles *Larra prismatica*, from Borneo, Malacca, and Celebes, of which it may be a variety.

Gen. BEMBEX, *Fabr.*

1. *Bembex melancholica*, *Smith*, *Cat. Hym.* pt. iv. p. 328; *Proc. Linn. Soc.* ii. p. 105.

Hab. Aru; Sumatra; Borneo.

Many of the specimens from Aru are less highly coloured than those of Sumatra or Borneo: the yellow markings on the abdomen are frequently much obliterated in the females; others are as highly coloured as any examples I have seen.

Gen. PISON, *Spin.*

1. *PISON NITIDUS*. *P. nitidus, niger, distinctè punctatus*; alis subhyalinis, venis fuscis; segmentis abdominalibus apice depressis.

Female. Length 5 lines. Black and shining; the head and thorax strongly punctured; the face beneath, the antennæ, the clypeus, cheeks, and the sides of the segments of the abdomen covered with a silvery down; the palpi pale testaceous; the mandibles obscurely ferruginous at their apex. The metathorax transversely striated behind, with a central longitudinal impressed line above, which is transversely striated, and terminates in a deep fovea just beyond the verge of the posterior inclined truncation; the wings subhyaline; the nervures dark fuscous; the first recurrent nervure received at the apex of the first submarginal cell, and the second at the base of the third submarginal. Abdomen shining, and more delicately punctured than the thorax; the margins of the segments deeply depressed.

Hab. Aru, Key Island.

Gen. GORYTES, *Latr.*

1. *GORYTES CONSTRICTUS*. *G. niger*; clypei lateribus flavis; collari, tuberculis postscutelloque flavis; segmentorum abdominis marginibus apicalibus flavis constrictis, pedibusque flavo variegatis.

Female. Length 6 lines. Black; the head and thorax very closely punctured and opaque, the head slightly shining on the vertex; the antennæ beneath and the apical half of the mandibles ferruginous, the latter black at their tips; the clypeus yellow at the sides, and coarsely rugose in front. Thorax: the metathorax coarsely longitudinally

rugose, with cinereous pubescence at the sides; the antennæ and intermediate tibiæ, the tarai, and articulations of the legs reddish-yellow; wings subhyaline, with a fuscous cloud in the marginal cell, which passes beyond to the apex of the wings; the nervures fusco-ferruginous; the tegulæ ferruginous. Abdomen shining, covered with a thin, fine, cinereous pile, and with the margins of the segments constricted; the apical margins of the segments with narrow yellow fasciæ, that on the fourth abbreviated on each side, on the fifth it is obsolete; beneath, the second segment is opaque, finely punctured, and pilose; the following segments smooth, shining, and with five scattered punctures.

The *Male* strongly resembles the female, but is smaller and less variegated with yellow; the face covered with silvery down; the scape and base of the flagellum ferruginous beneath; the clypeus yellow, except its extreme base. The thorax black, with the legs rufo-piceous; the tibiæ and tarai pale ferruginous, variegated with yellow; the sides of the thorax beneath the wings longitudinally striated in both sexes, most conspicuously so in the male. The abdomen with three narrow interrupted fasciæ.

Hab. Aru.

2. *GORYTES VAGUS*. *G. niger*; clypeo maculis duabus flavis notato; postscutello et segmentis primo et secundo fasciâ apicali flavis, fasciâ in segmento primo subinterrupto.

Female. Length 6 lines. Black; the head finely punctured and shining; the anterior margin of the clypeus emarginate in the middle, and more deeply so on each side; on each side of the clypeus, at its base, is an oblique yellow spot, and anteriorly it is roughly punctured; the mandibles roughened at their base, their apical half smooth, shining, and ferruginous, with their apex black. Thorax subopaque, very closely punctured, and slightly shining; the metathorax coarsely longitudinally rugose-striate; the postscutellum yellow; wings subhyaline and iridescent, the nervures fusco-ferruginous; a dark fuscous cloud occupies the marginal cell. Abdomen smooth and shining, with a slightly interrupted fascia a little before the apical margin of the basal segment; the second segment has a fascia at its apical margin; both are yellowish white; the first is gradually widened towards the sides of the segment, the second abruptly widened, with the angle of the widened portion pointed inwards; beneath the abdomen is glossy, with the basal segment closely punctured and subopaque; the margins of abdominal segments slightly constricted.

Hab. Key Island.

Gen. *TRYPOXYLON*, *Latr.*

1. *TRYPOXYLON EXIMIUM*. *T. nigrum*; clypeo argentato-pubescente; abdominis segmentis secundo tertio quartoque basi rubris; alis hyalinis.

Female. Length $8\frac{1}{2}$ lines. Black, smooth, and shining; the head and thorax very delicately punctured; the face and clypeus below the insertion of the antennæ densely covered with silvery-white pubescence; the anterior margin of the clypeus rounded and much produced, with a slight curving upwards at its margin; the mandibles yellow, with their apex ferruginous; the palpi pale testaceous; the inner orbits of the eyes very deeply notched. Thorax: the metathorax, the sides, and beneath with a thin silvery-white pubescence, most dense on the former; the metathorax not distinctly enclosed at its base, but with two shallow impressed lines, which mark the form of the usual enclosed space; a central longitudinal channel extends from its base to the apex, slightly sub-interrupted in the middle; the wings hyaline and iridescent, the nervures dark fuscous; the anterior and intermediate tibiæ in front, their tarsi, the apical joints of the posterior pair, and the base of the tibiæ very pale ferruginous; the claw-joint of the intermediate and posterior tarsi fuscous above; the calcaria pale testaceous. Abdomen, the second, third, and base of the fourth segment more or less ferruginous; the apex of the basal petiolated joint ferruginous beneath.

Hab. Aru and Key Island.

Gen. CRABRO, *Fabr.*

1. CRABRO SOLITARIUS. *C. niger*; abdomine petiolato; scapo flagellique articulo ultimo, collari, tuberculis, postscutelli maculis duabus flavis; pedibus petioleque basi ferrugineis.

Female. Length 5 lines. Black and opaque; the head large, quadrate, and wider than the thorax; the ocelli in a curve on the vertex; the clypeus covered with silvery pubescence, carinated in the middle, and slightly produced; the scape and basal joint of the flagellum pale yellow. Thorax: an interrupted line on the collar, the tubercles, a spot beneath the wings, and two minute ones on the postscutellum yellow; the disk of the thorax longitudinally delicately rugose; the metathorax obliquely striated, with an enclosed space at its base, and having a central longitudinal channel, the sides covered with thin silvery pubescence; the wings hyaline and iridescent, the nervures fuscous; the legs ferruginous, variegated with yellow. Abdomen: the basal petiolated segment ferruginous, with its apical half black above; the apical segment with an angular shape at its base, which is smooth and shining, with its lateral margins carinate, the extreme apex ferruginous; beneath smooth and shining, with the apical margins rufo-piceous.

Hab. Aru.

This species would, according to the views of some Hymenopterists, belong to the genus *Rhopalum* of Kirby.

Group SOLITARY WASPS.

Fam. EUMENIDÆ, *Westw.*Gen. EUMENES, *Latr.*

1. *Eumenes arcuata*, *Fabr. Syst. Pies.* 287. 11.

Hab. Key Island; coast of New Guinea (Triton Bay); Australia.

Gen. PACHYMENES, *Sauss.*

1. *PACHYMENES VIRIDIS*. *P. lætè viridis*; facie pube argentato-albâ tectâ; alis hyalinis.

Female. Length 8 lines. Bright green; the head, thorax, and basal segment of the abdomen rugose, the rest of the abdomen finely and very closely punctured; the clypeus thinly covered with a fine silvery-white pubescence, its apex produced and truncate. Thorax: the metathorax rounded behind, a deep longitudinal impressed line in the middle, and with fine silvery down at the sides and behind; the wings subhyaline, with a fuscous stain along the anterior margin of the superior pair; the legs rufo-piceous; the coxæ, femora, and tibiæ more or less tinged with green.

Hab. Aru.

Gen. RHYNCHIUM, *Spin.*

1. *Rhynchium mirabile*, *Sauss. Mon. Guêpes Sol.* 106. 6, t. 14. f. 5 ♀.

Hab. Aru; Tasmania.

The *Male* of this fine species closely resembles the female; it is black, with a transverse spot above the insertion of the antennæ, an abbreviated narrow line behind the eyes, another on the lower margin of their emargination; the scape in front and the clypeus yellow, the latter notched at its apex; a minute yellow spot at the base of the mandibles; the antennæ, tibiæ, apex of the femora, and the tarsi ferruginous; the basal joint of the intermediate and posterior tarsi dusky; the intermediate femora deeply excavated or hollowed beneath; the prothorax yellow above; the metathorax truncate, transversely striated with several minute teeth on the lateral margins; the wings hyaline, tinted with yellow, their apical margins slightly clouded; the apical margins of all the segments of the abdomen bordered with yellow, that on the first segment narrowest. The only particulars in which the female apparently differs from Saussure's description, is that the second fascia on the abdomen is *widest at the sides*, and there are *three little teeth* on each side of the margins of the metathorax.

The *Female* is also in the Paris Museum.

2. *Rhynchium superbum*, *Sauss. Mon. Guêpes Sol.* p. 113. 18.

Hab. Aru; New Holland.

Our example of this species slightly differs in coloration from the description of Saussure. He says, "black, with the vertex, the front, the prothorax, and the border of all the segments of the abdomen, except the first, yellow; the wings yellow;" in the Aru specimen, the sinus of the eyes, a spot above the clypeus, a reversed crescent-shaped spot crossing the ocelli, two oblique spots behind them, and a broad elongate stripe behind the eyes yellow. These slight differences cannot characterize more than a variety; in every other particular they exactly correspond.

Gen. ODYNERUS, *Latr.*

1. ODYNERUS PETIOLATUS. *O. niger*; clypeo apiculato; capite, thorace abdomineque flavo variis; abdomine petiolato; alis subhyalinis.

Female. Length $7\frac{1}{2}$ lines. Black; head and thorax strongly punctured; two confluent spots between the antennæ, a line on the inner orbits of the eyes, terminating in their emargination, an oblong spot behind them, a spot at the base of the mandibles, the scape in front, and the clypeus yellow; the latter with a large black spot in the middle, and with its anterior margin prolonged into an acute point; the mandibles ferruginous, with their base and margins black; the flagellum fulvous beneath. Thorax: an interrupted line on the collar, a spot beneath the wings, the outer margin of the tegulæ, two spots on the scutellum, two longitudinal curved lines on the metathorax, extending from the base to the apex, yellow; the yellow lines on the metathorax curving inwards. The tibiæ, tarsi, and apex of the femora ferruginous; the intermediate and posterior tibiæ with a fuscous line outside, a spot on the coxæ outside, a stripe at the apex of the anterior femora beneath, another on the intermediate pair, and a line on the anterior tibiæ, behind, yellow; wings subhyaline, their margins fuscous. Abdomen petiolated; a fascia on the apical margins of all the segments, and the petiole, yellow; the third and following fasciæ narrowest; all the fasciæ continued beneath the abdomen.

Hab. Aru.

2. ODYNERUS AGILIS. *O. niger*; capite thoraceque distinctè, abdomine delicatè punctatis; pedibus ferrugineis; abdominis segmentis duobus basalibus flavo fasciatis; alis subhyalinis.

Male. Length 6 lines. Black; the scape in front, a line on the inner margin of the eyes, terminating in their emargination, an abbreviated line behind them, and the clypeus yellow; the latter deeply emarginate, forming two teeth. Thorax: a line in the middle of the anterior margin of the prothorax, two spots on the verge of the emargination of the metathorax, and a fascia on the apical margins of the first and second segments of the abdomen yellow; the legs ferruginous; the wings subhyaline, the anterior margin of the superior pair fuscous; the outer margin of the tegulæ yellowish.

Hab. Aru.

3. *ODYNERUS MULTIPICTUS*. *O. niger, flavo maculatus et punctatus; pedibus flavis, alis hyalinis.*

Female. Length 4 lines. Black; the head and thorax strongly punctured, the abdomen finely and distantly so; the clypeus, a spot above it, the inner and outer orbits of the eyes, and the scape in front yellow; the clypeus deeply emarginate in front; the mandibles ferruginous, with a yellow spot at their base. Thorax: the prothorax in front, the tegulæ and two spots beneath the wings, the scutellum, and sides of the metathorax yellow; the legs yellow, with ferruginous stains; the femora with a black or dark stain above; wings hyaline, with a fuscous stain along the anterior border of the superior pair. Abdomen: a yellow fascia on the apical margins of the two basal segments; the three following segments with very narrow yellow borders, and the apical segment entirely reddish-yellow.

Hab. Arn.

4. *ODYNERUS MODESTUS*. *O. niger; abdominis segmentis duobus basalibus flavo fasciatis; tibiis tarsisque ferrugineis; alis hyalinis; abdominis segmento primo basi transversim bicarinato.*

Female. Length 4 lines. Black; head and thorax coarsely punctured; the vertex swollen; the scape of the antennæ, a spot between them, and the clypeus yellow; the latter with a transverse black spot in the middle, deeply notched in front, and having a carina on each side, in a line with the angle or tooth of the emargination; the flagellum ferruginous towards the apex beneath; wings hyaline, with a fuscous cloud in the marginal cell; the tibiæ and tarsi ferruginous. Abdomen: the base truncate, with an oblique space above the truncation, the margin of both defined by an elevated ridge or carina; a narrow fascia on the apical margin of the basal segment, and a broader one on the second; the latter continued beneath the abdomen.

Hab. Arn.

This species is undoubtedly allied to *O. Sichellii* of Saussure; but, beside differing in the colour of its legs, and of the bands of the abdomen, it wants the strong tubercle at the base of the second segment of the latter.

Gen. ALASTOR, *St.-Farg.*

1. *ALASTOR UNIFASCIATUS*. *A. niger; maculâ inter antennis, abdominisque margine apicali et segmento secundo flavis; alis fuscis.*

Female. Length $6\frac{1}{2}$ lines. Black; the head and thorax strongly punctured; the face, sides of the clypeus, cheeks, and base of the mandibles with a fine silky silvery-white pubescence; the clypeus convex, its anterior margin emarginate; from each angle of the emargination a shining carina runs more than halfway up the clypeus; a minute spot between the antennæ, and two on the anterior margin of the prothorax, yellow; the wings fuscous, palest at their posterior mar-

gina. Abdomen finely and closely punctured; the third segment strongly so; a broad yellow fascia on the apical margin of the second segment.

Hab. Aru.

2. *ALASTOR APICATUS*. *A. niger*; abdominis segmentis primo et secundo aurantiaco-rubris; alis fuscis.

Male. Length $5\frac{1}{2}$ lines. Black; the head and thorax strongly punctured; a spot between the antennæ, the scape in front, and the clypeus yellow; the latter with a large black spot at its base, anteriorly deeply emarginate; wings fuscous; the tegulæ with a rufo-testaceous spot at their outer margins; the tarsi and articulations of the legs ferruginous. Abdomen bright orange-red, with the third and following segments black; the base rugose, the second segment finely punctured, the rest much more strongly so.

Hab. Aru.

Group SOCIAL WASPS.

Fam. VESPIDÆ, *Steph.*

1. *ISCHNOGASTER IRIDIPENNIS*. *I. rufescenti-fuscus flavo varius*; vertice et metathorace nigris, alis subhyalinis et pulcherrimè iridescentibus.

Male. Length $7\frac{1}{4}$ lines. Head yellow, above the insertion of the antennæ black; antennæ black, with the scape, basal joint of the antennæ, and the mandibles ferruginous; the flagellum obscurely ferruginous beneath; the clypeus produced at the apex into an acute tooth. Thorax pale ferruginous; the metathorax black, with a ferruginous spot on each side in front; the scutellum with a reddish-brown spot in the middle, the postscutellum yellow and subinterrupted in the middle; the sides of the thorax yellow anteriorly, the yellow portion with two black spots; the legs slightly variegated with yellow; wings subhyaline and brilliantly iridescent, the marginal cell with a fuscous cloud. Abdomen brown; the petiole pale testaceous at its apex and ferruginous beneath, longer than the head and thorax; the second segment has a yellow macula on each side, and, beneath, a smaller spot on each side in a line with the side spots; the first segment has its basal portion yellow beneath, and a blackish spot in the centre rather behind the middle.

Hab. Aru.

This species in many particulars agrees with the *I. nitidipennis* of Saussure, but differs in too many, I think, to be considered the same species; the second recurrent nervure is straight at the upper extremity, then curved towards the margin of the wing, and again straight at its lower extremity; the third submarginal cell is much wider than the fourth.

Gen. ICARIA, *Sauss.*

1. *Icaria maculiventris*, *Sauss. Mon. Guépes Soc.* p. 23. 1.—*Rhopalidia maculiventris*, *Guér. Voy. Coq. Zool.* ii. pt. 2. *Ins.* p. 267, pl. 9. fig. 8.
Hab. Aru; New Guinea.

2. *ICARIA NIGRA*. *I. nigra*; clypeo anticè angulato; metathorace concavo et transversim striato; alis hyalinis.

Female. Length 6 lines. Black, punctured and opaque; the clypeus terminating in a sharp-pointed angle; the base and apex of the mandibles rufo-piceous; the scape ferruginous in front; the face with a thin, fine, griseous pubescence. Thorax slightly margined in front; an obscure testaceous spot on each side of the postscutellum, the metathorax concave and transversely striated; wings hyaline. Abdomen with a short petiole to the basal segment, which is very short and campanulate; at its posterior margin are two minute, obscure, pale spots; beneath, the margins of the apical segments are rufo-piceous.

Hab. Aru.

3. *ICARIA FASCIATA*. *I. nigra*; clypei margine antico, maculis duabus postscutelli flavis; segmentis abdominis ad apicem flavo angustè fasciatis.

Female. Length 5 lines. Black; the clypeus angular in front, its anterior margin and a spot on the mandibles yellow; the antennæ rufo-testaceous beneath. Thorax: the anterior margin of the prothorax slightly rebordered; the anterior coxæ with a spot in front and two spots on the postscutellum yellow; the anterior and intermediate tibiæ beneath, the tarsi beneath and the claw-joint entirely, ferruginous; wings hyaline with a fuscous stain along the anterior margin of the superior pair; the metathorax oblique and slightly concave, with an acute stout tooth on each side. Abdomen: the basal segment campanulate, the petiole short; a narrow yellow fascia on the apical margin of all the segments.

Hab. Aru.

4. *ICARIA BRUNNEA*. *I. rufescenti-fusca*; coxis femoribusque obscuris; alis hyalinis.

Female. Length $3\frac{1}{2}$ lines. Reddish-brown; head and thorax punctured, the abdomen finely rugose; the clypeus and mandibles pale ferruginous, the former with a darker spot in the middle, the anterior margin angular. The anterior margin of the prothorax slightly rebordered; the wings hyaline and iridescent, with a fuscous stain along the anterior margin of the superior pair; the metathorax abruptly truncate. Abdomen: the basal margin of the third and following segments black.

Hab. Aru.

5. *ICARIA GRACILIS*. *I. nigra flavo variegata*; abdominis segmento basali elongato, gracili et petiolato; alis hyalinis.

Female. Length 7 lines. Black; the scape in front, the sides and apical margin of the clypeus, and a spot at the base of the mandibles yellow; the cheeks reddish-yellow; the antennæ ferruginous; the head covered with short griseous pubescence. Thorax with obscure ferruginous tints and a short griseous pubescence, most dense on the sides and beneath; the anterior margin of the prothorax, the tegulæ, scutellum and postscutellum, a broad stripe on each side of the metathorax, the coxæ, and the anterior and intermediate femora, at their apex beneath, yellow; the scutellum with a ferruginous stain in the middle, the postscutellum with a black stain, the coxæ ferruginous above, the tibiæ and tarsi ferruginous beneath; wings hyaline, with a fuscous stain along the anterior margin of the superior pair. Abdomen: a yellow fascia on the apical margin of the first and second segments; that on the following segments rufo-testaceous.

Hab. Aru.

6. *ICARIA UNICOLOR.* *I. rufescenti-fusca*, tenuiter cinereo-pubescent.

Female. Length 5 lines. Reddish-brown, covered with a thin cinereous pubescence; the clypeus acutely angular anteriorly; the metathorax oblique and delicately striated transversely; wings fusco-hyaline; the petiole of the abdomen long, the segment campanulated and narrow.

Hab. Key Island.

Gen. *POLISTES*, Latr.

1. *Polistes tepidus*, *Fabr. Syst. Piez.* p. 271. 7.

Hab. Aru; Key Island; Solomon Islands; New Guinea; Australia.

2. *Polistes diabolicus*, *Sauss. Mon. Guêpes Soc.* 68. 26, t. 6. f. 7.

Hab. Aru; Java; Timor.

3. *Polistes stigma*, *Fabr. Syst. Piez.* p. 261. 41.

Hab. Aru; Celebes; Ceram; India.

Var. The specimens from Aru differ from the typical ones in wanting the two longitudinal yellow lines on the metathorax, which is entirely black. Saussure has a variety with the metathorax black between the lines; of two examples from Celebes, one has the yellow lines entire, the other has them abbreviated at half their length.

4. *POLISTES NIGRIFRONS.* *P. capite thoraceque nigris, flavo et ferrugineo variegatis; abdomine ferrugineo, segmentis basi nigris, marginibus apicalibus flavis.*

Female. Length 8 lines. Head and thorax black; the anterior margin of the clypeus angular and narrowly rufo-testaceous; the mandibles, palpi, and antennæ ferruginous; the scape, and flagellum above, except the basal joint, fuscous; the outer orbits of the eyes with a narrow yellow line. The anterior margin of the prothorax slightly rebordered, the posterior margin ferruginous; the outer margin of the tegulæ reddish-yellow; wings subhyaline with a fusco-ferruginous stain along the anterior margins of the superior pair; the metathorax

finely striated transversely, and with two yellow stripes running upwards halfway from the base, the posterior margin of the pectus, tips of the coxæ, the femora at their base and apex, the tibiæ and tarsi beneath, ferruginous; tips of the femora, and tibiæ above, yellowish. Abdomen ferruginous, with the base of the second and following segments black; the first and three following segments with a yellow fascia on their apical margins; beneath, the two basal segments entirely ferruginous.

Hab. Aru.

This species is closely allied to the *P. fastidiosus* of Saussure, and, notwithstanding the difference in colouring, may possibly, I think, be an extreme variety of that species.

5. *POLISTES ELEGANS*. *P. ferrugineus*; capite thoraceque flavo variis; segmentis abdominis flavo marginatis.

Female. Length 8 lines. Ferruginous; the clypeus, mandibles, cheeks, and the face, as high as the middle of the emargination of the eyes, yellow. Thorax: the margins of the prothorax, two longitudinal stripes on the mesothorax, the scutellum, postscutellum, and sides of the metathorax broadly, yellow; the legs beneath, the coxæ and the sides of the thorax spotted with yellow; the intermediate and posterior coxæ spotted with ferruginous or fusco-ferruginous; the metathorax finely striated transversely; the wings hyaline with the nervures ferruginous. Abdomen: the first and three following segments with yellow marginal fasciæ, that on the fourth usually more or less obliterated.

Hab. Aru; Key Island.

Fam. EVANIDÆ, Leach.

Gen. FÆNUS, Fabr.

1. *FÆNUS GRACILIS*. *F. niger*, facie lateribusque thoracis argenteo pilosis; pedibus anticis et intermediis pallidè -rufo-testaceis, tibiis posticis basi tarsisque albis; abdomine subtùs rufo-testaceo.

Female. Length 6 lines. Black; sub-opake; the face, sides of the thorax and beneath with silvery pubescence; the mandibles, palpi, and scape in front rufo-testaceous. Thorax: the anterior and intermediate legs rufo-testaceous, the femora having a darker stain above; the posterior legs black, with the base of the tibiæ and the tarsi white. Abdomen rufo-testaceous beneath; the ovipositor white at its apex.

Hab. Aru.

Gen. STENOPHASMUS.

Head globose; antennæ longer than the body, and very slender and setaceous; the prothorax forming a slender neck; the anterior wings with one marginal and three submarginal cells; the femora slightly

incrassate, not denticulate; the tarsi 5-jointed. Abdomen petiolated, the petiole as long as the abdomen; the ovipositor as long as the petiole and abdomen united.

This genus is founded on the examination of a single individual, which in general appearance exactly resembles the smaller species of the genus *Megischus*; on examination, however, it will be found that it differs from that genus in the neuration of the anterior wings; its femora are not denticulate, in which character it differs from both *Megischus* and *Stephanus*; with the latter genus it agrees in having 5-jointed tarsi.

1. *STENOPHASMUS RUFICEPS*. *S. niger*; capite et antennarum basi rufis; ovipositore tarsisque pallidè testaceis; petiolo abdominis cylindrico; alis subhyalinis.

Female. Length 5 lines. Black, slightly shining; head globose, red and sprinkled with white hairs, and delicately striated transversely. Thorax sprinkled with white pubescence above, the sides more thickly clothed with the same; above, the thorax is transversely rugose, on the metathorax becoming more regularly striate; the metathorax has a central longitudinal carina and also one on each side; the legs sprinkled with erect white hairs; the tarsi pale rufo-testaceous with the claw-joint black; wings subhyaline, with a broad light-fuscous stain along the centre of the anterior pair; a hyaline streak crosses them at the base of the stigma. Abdomen: the petiole as long as the thorax, narrowest at the base of the abdomen; it is rugose at the base; the ovipositor pale testaceous.

Hab. Aru.

Fam. ICHNEUMONIDÆ, *Leach*.

Gen. ICHNEUMON.

1. *ICHNEUMON INSULARIS*. *I. niger*; capite thoraceque albo variegatis; abdominis segmentorum primo, secundo tertioque albo maculatis.

Length $7\frac{1}{2}$ lines. Black; the orbits of the eyes, the face before the antennæ, the mandibles and palpi yellowish-white; the flagellum with the joints from the 14th to 25th white. Thorax: a line on each side before the tegulæ, a spot beneath the wings, two at the sides of the pectus, the anterior coxæ in front, and a narrow line on each side of the scutellum yellowish-white; the anterior and intermediate legs and a spot beneath the posterior tibiæ rufo-testaceous; the wings hyaline, the nervures black. Abdomen: a minute spot at the lateral apical margins of the three basal segments, and a large central one on the two apical segments, white.

Hab. Key Island.

Gen. CRYPTUS, *Fabr*.

1. *CRYPTUS SCUTELLATUS*. *C. ferrugineus*; tibiis posticis tarsisque albo annulatis; scutello tuberculato.

Female. Length 5 lines. Ferruginous; the face testaceous-yellow, an elongate black spot on the vertex enclosing the ocelli and extending to the insertion of the antennæ; the latter black, with the scape ferruginous in front. Thorax: the scutellum elevated, forming a compressed tubercle, its side view wedge-shaped; the wings hyaline the nervures black, the base of the wings yellowish; the apical joints of the intermediate tarsi, the tips of the posterior femora, the extreme base of the tibiæ, their apical half, and the tarsi black; the intermediate portion of the tibiæ yellow; the apical segment of the abdomen black.

Hab. Aru.

Gen. MESOSTENUS, Grav.

1. *MESOSTENUS PICTUS.* *M. niger*; capite thoraceque flavo striatis et punctatis; pedibus flavis nigro et ferrugineo lavatis; segmentis abdominalibus flavo marginatis; alis hyalinis.

Female. Length 8 lines. Black; a large ovate spot on the cheeks touching the mandibles, the labrum, palpi, inner orbits of the eyes, and from the 7th to the 10th joints of the antennæ yellowish-white. Thorax: an ovate spot in the middle of the disk of the mesothorax, the tegulæ, a spot beneath them, two larger spots beneath the wings, the scutellum, a spot on the postscutellum uniting with another at the base of the metathorax, a trilobed spot at its apex, and a subovate one on each side yellowish-white; the coxæ white with black stains on the intermediate and posterior pairs; the femora white beneath, the anterior and intermediate pairs with a black line above, the posterior pair ferruginous above; the tibiæ and tarsi whitish beneath, stained more or less fusco-ferruginous above; wings hyaline. Abdomen: all the segments with yellowish-white fasciæ on their apical margins, the fasciæ continued beneath; the ovipositor about the length of the abdomen, the valves broadest at their apex.

Hab. Aru.

2. *MESOSTENUS AGILIS.* *M. niger*; antennis medio albis; thorace pedibusque albo variegatis; abdominis marginibus fasciis albis.

Female. Length 5 lines. Black; the joints of the antennæ, from the 6th to 13th, white, the vertex also white. Thorax: a spot in the middle of the disk of the mesothorax, the scutellum, a spot on the postscutellum, two beneath the wings, the apex of the metathorax, and a spot on each side white; the legs white, the anterior pair slightly fuscous above; the intermediate femora and tibiæ beneath, and the tarsi above, black; the posterior femora above and beneath the tibiæ, except their extreme base and the base and apex of the tarsi, black; wings hyaline, the nervures black. Abdomen: the apical margins of the segments, excepting the fourth and fifth, with white fasciæ, the second and third fasciæ attenuated in the middle.

Hab. Aru.

3. *MESOSTENUS ALBOPICTUS*. *M. niger*, albo varius; alis hyalinis.

Female. Length 7 lines. Black; the clypeus, mandibles, palpi, the joints of the antennæ from the sixth to the thirteenth, and a broad stripe at the inner orbits of the eyes white. Thorax: an ovate spot on each side of the prothorax above, a similar spot in the middle of the mesothorax, the tegulæ, scutellum and postscutellum, a T-shaped spot reversed on the metathorax, a large quadrate one on its sides, three irregular-shaped maculæ beneath the wings, and the anterior and intermediate legs white, the legs with a black line above; the posterior legs have a large spot on the coxæ behind, the trochanters, the tibiæ, and tarsi white, the tibiæ black at their apex, and the femora palish at their base outside; the wings hyaline and iridescent, with the nervures black. The abdomen beneath, and the apical margins of the segments above, white.

Male. Rather smaller than the female, but only differs otherwise in the colour of the legs, the anterior and intermediate pairs being entirely yellowish-white, excepting the intermediate tibiæ and tarsi, which are slightly fuscous above; the posterior femora are ferruginous, the tibiæ and tarsi white, with the base and apex of the two former black as well as the apical joint of the tarsi.

Hab. Key Island.

Gen. *PIMPLA*, *Fabr.*

1. *PIMPLA OCHRACEA*. *P. ochracea*; antennis ferrugineis; facie luteâ; alis hyalinis, apice fuscis.

Female. Length 5 lines. Entirely ochraceous, with the face and scape in front yellow; the body beneath is pale ochraceous; the antennæ ferruginous, above dusky; the eyes emarginate within; the tarsi have the tips of the claws black; the wings flavo-hyaline, with the apex of the anterior pair fuscous, the nervures black, becoming yellow at the base of the wings. The head, thorax, legs, and base of the abdomen smooth and shining; the abdomen, except the base, finely punctured; a transverse impressed row of punctures a little before the apical margin of each segment, and the space between impunctate.

Hab. Aru.

2. *PIMPLA BRACONOIDES*. *P. rufo-flava*; antennis tarsisque et abdominis dimidio posteriori nigris; alis fuscis, dimidio basali flavis.

Female. Length 6 lines. Ferruginous; the posterior tarsi and the fourth and following segments of the abdomen black; the head is reddish yellow, the eyes brown; the scape and two or three of the basal joints of the flagellum ferruginous, the rest fuscous; the basal half of the wings flavo-hyaline, the apical half fuscous; the stigma yellow, with a subhyaline macula beneath, and two other similar irregular-shaped spots. The abdomen with two longitudinal carinæ

on the basal segment, and a transverse curved impressed line on the other segments.

Hab. Key Island.

This species might at first sight be mistaken for a species of the genus *Bracon*. The male only differs from the female in having the abdomen black, with only the basal segment yellow; the wings are only very slightly yellow at their base; it is also rather smaller.

3. *PIMPLA PENETRANS*. *P. flavo-ferruginea*; flagello fusco; alis flavo-hyalinis, apice fuscis.

Female. Length $4\frac{1}{2}$ lines. Reddish yellow, smooth, and shining; the face testaceous, with slight fuscous stains; the scape and two or three of the basal joints of the flagellum yellow in front; the wings hyaline, with a yellowish tinge; the nervures black, except the costal nervure, which is ferruginous towards the base, the apex of the wings slightly clouded; the posterior tibiæ fuscous above. Abdomen: the segments with slightly impressed oblique depressions, the ovipositor shorter than the abdomen, and black.

The *Male* only differs in having the abdomen rather more slender.

Hab. Aru.

4. *PIMPLA FERRUGINEA*. *P. flavo-ferruginea*; antennis supra fuscis; alis hyalinis.

Female. Length $5\frac{1}{2}$ lines. Ferruginous, with the head and thorax beneath yellow-testaceous; the coxæ also are of the same colour; the flagellum slightly fuscous above; the wings flavo-hyaline, the nervures black; the two basal segments of the abdomen shining, the third and the following segments subopaque; the ovipositor as long as the abdomen.

Hab. Key Island.

5. *PIMPLA PLAGIATA*. *P. flavo-rufa*; antennis strigisque tribus mesothoracis nigris; alis hyalinis, apice cellulae marginalis fusco unimaculato.

Female. Length $5\frac{1}{2}$ lines. Yellow, the legs with ferruginous stains; the antennæ black, with the scape yellow in front; the head with a large ovate black spot behind the ocelli. Thorax finely punctured on the disk of metathorax, which has three longitudinal broad black stripes, a narrow black line on the posterior margin of both the scutellum and postscutellum; wings hyaline, the nervures black, with a dark fuscous spot at the apex of the marginal cell. Abdomen reddish-yellow, with the apical margins of the segments yellow; the ovipositor black, and shorter than the abdomen.

Hab. Aru.

Gen. RHYSSA, Grav.

1. *RHYSSA MACULIFENNIS*. *R. rufescenti-flava*; antennis et vertice nigris; alis hyalinis, plaga nigro-fusca.

Male. Length 9 lines. Ferruginous; the head of a yellow testaceous, with the vertex and antennæ black; the scape ferruginous in front; the mandibles black. Thorax: the mesothorax and scutellum transversely rugose, the former with two deeply impressed lines in front, which converge inwards, and meet in the middle of the disk; wings hyaline, with a yellow tinge on the anterior pair, the nervures black; a black stripe crosses the middle of the marginal cell, and terminates at the inferior margin of the discoidal cell; the legs ferruginous, with the posterior tarsi black. Abdomen smooth, shining, ferruginous.

Hab. Aru.

2. *RHYSSA VESTIGATOR.* *R. ferruginea*; *antennis, mesothorace, metathoracisque basi nigris*; *abdomine lineari, nitido et lævi*; *alis hyalinis, apice subfuscato.*

Male. Length 9 lines. Head testaceous-yellow, with the vertex ferruginous; the antennæ fusco-ferruginous. Thorax black, with the prothorax, a large oblique spot beneath the wings, the scutellum, and metathorax yellow, the base of the latter black; the mesothorax and scutellum rugose; the metathorax smooth and shining; the legs ferruginous, with the anterior coxæ in front and the posterior pair behind yellow; the posterior coxæ black beneath; wings hyaline, faintly clouded at their apical margins. Abdomen elongate, linear, glossy, smooth, and shining, ferruginous, with the base and lateral margins blackish.

Hab. Aru.

Gen. *BRACON*, *Fabr.*

1. *BRACON BASALIS.* *B. capite, thorace, pedibus anticis et intermediis, femoribus posticis ferrugineis*; *tibiis tarsisque et abdomine nigris, segmento basali flavo*; *alis fusco-hyalinis.*

Female. Length $4\frac{1}{2}$ lines. The head, scape in front, thorax, anterior and intermediate legs, the posterior coxæ, trochanters, and femora, and the first segment of the abdomen, and a semicircular spot in the middle of the base of the second, yellow-ferruginous; the antennæ, the posterior tibiæ and tarsi, fuscous; abdomen shining black; the thorax smooth and shining; the wings fusco-hyaline. The basal segment of the abdomen with a longitudinal impressed line on each side, the second segment with an oblique depression, the third with an impressed line, curved forwards and extending to the lateral margins; the base of the segment has a row of short, deeply impressed striæ; the ovipositor shorter than the abdomen.

Hab. Aru.

2. *BRACON ALBO-MARGINATUS.* *B. capite, thorace pedibusque ferrugineis*; *abdomine nigris annulis albo-marginatis*; *alis fusco-hyalinis.*

Female. Length $4\frac{1}{2}$ lines. Head, thorax, and legs ferruginous, smooth, and shining; antennæ and abdomen black, the latter smooth and

shining, the posterior margins of the third and following segments with a narrow bluish-white fascia; the posterior tarsi slightly fuscous; the wings fusco-hyaline; the ovipositor a little longer than the abdomen.

Hab. Aru.

3. *BRACON NIGRIPENNIS*. *B.* thorace, pedibus anticis et intermediis, femoribusque posticis ferrugineis; tibiis tarsisque posticis et abdomine nigris; alis nigro-fuscis; capite luteo-testaceo.

Female. Length 9 lines. Head testaceous, the antennæ black. Thorax, anterior and intermediate legs, the posterior coxæ, trochanters and femora, the tegulæ, extreme base of the wings, and the base of the stigma ferruginous; the thorax smooth and shining; the wings brown-black, with a small hyaline spot in the first submarginal cell. Abdomen longitudinally aciculate, a central carina at the base of the first segment, the second segment with an oblique impressed line running from the lateral angles of its basal margin, and meeting in the centre of its posterior margin; the margins of all the segments constricted; the ovipositor shorter than the abdomen.

Hab. Aru.

4. *BRACON EXOLETUS*. *B.* niger; capite, thorace, pedibus anterioribus et intermediis ferrugineis; alis subhyalinis.

Female. Length 5 lines. Head, scape of the antennæ, thorax, anterior and intermediate legs, ferruginous; flagellum and tips of the mandibles black. Thorax smooth and shining; wings fusco-hyaline, the nervures dark brown; the posterior legs fusco-ferruginous. Abdomen rugose and subopaque; the basal segment black in the middle, with the base and lateral margins ferruginous, the sides deeply channelled; the second segment with an arrow-headed shining space in the middle of its base; the ovipositor shorter than the abdomen.

Hab. Aru.

5. *BRACON ABDOMINALIS*. *B.* rufo-flavus; antennis fuscis; alis subhyalinis; abdomine ovato.

Female. Length 3 lines. Reddish yellow; head and thorax smooth and shining; the head narrower than the thorax; wings fusco-hyaline; abdomen ovate, broader than the thorax, the first and second segments rugose, with deep sculptured impressions; the second segment has an ovate shining space in the middle at its basal margin; the third segment is deeply depressed and sculptured at the base, leaving a transverse arched space at its apex, the width of the entire segment; the following segments have their margins very deeply depressed.

Hab. Aru.

6. *BRACON NITIDUS*. *B.* niger; capite, thorace pedibusque et abdominalis segmento primo ferrugineis, totis nitidissimis.

Female. Length 4 lines. Ferruginous, with the flagellum, second and

following segments shining black; the thorax smooth and shining, with the scutellum prominent; the wings subhyaline, their apical margins clouded, their extreme base yellowish, the nervures dark brown, the stigma black. Abdomen: the second and third segments with deeply impressed oblique lines on each side, and the basal margins of the following segments depressed.

Hab. Aru.

7. *BRACON PALLIFRONS*. *B. niger*; thorace pedibusque anticis et intermediis ferrugineis; alis fuscis.

Female. Length 6 lines. Head obscure, testaceous yellow; the eyes brown; the antennæ black. Thorax and the anterior and intermediate legs ferruginous; an ovate black spot on the metathorax; and the posterior legs black, with the articulations obscurely ferruginous; wings dark fuscous, with the nervures and stigma black, the base of the latter yellowish, and a hyaline streak beneath it, which crosses the first submarginal cell. Abdomen black and shining; the first segment with some coarse strizæ at the apex; the second with a central forked carina and an oblique one on each side running inwards to the apex of the segment; between the carinæ are a number of deep grooves; the lateral margins of the three basal segments carinated; the third segment has a row of short deep strizæ at its base; the ovipositor longer than the body.

Hab. Aru.

8. *BRACON INTRUDENS*. *B. niger*; thorace, pedibus anticis intermediisque et abdominis segmento basali ferrugineis; alis hyalinis.

Female. Length 5 lines. Black; the thorax, anterior and intermediate legs, the articulations of the posterior pair, and the base of the abdomen ferruginous, entirely smooth and shining; the wings subhyaline, the nervures fusco-ferruginous, an irregular fuscous stain at the base of the first submarginal cell, extending beyond it. Abdomen: the basal segment margined at the sides; the second segment with an oblique deeply impressed line running inwards, not quite meeting or extending to the apical margin.

Hab. Aru.

Gen. AGATHIS, Latr.

1. *AGATHIS FUMIPENNIS*. *A. ferruginea*; capite, abdominis apice tarsisque posticis nigris; alis obscure fuscis.

Female. Length 4 lines. Reddish-yellow; the head, apical joint of the intermediate tarsi, the apex of the posterior tibiæ, and the third and following segments of the abdomen black; the thorax and legs with a thin, short, pale fulvous pubescence; the head and abdomen smooth and shining; the head produced before the eyes into a kind of beak, rufo-piceous anteriorly. Thorax narrowed before the wings, which are dark fuscous, with a hyaline irregular mark below the

stigma, crossing the submarginal cell; the anterior margin of the anterior wings pubescent; the metathorax broad, margined laterally, with a central forked carina, and a crooked one on each side; the posterior legs incrassate. Abdomen with the sides of the upper surface carinated.

Hab. Aru.

Fam. CHRYSIDIDÆ, *Leach*.

Gen. STILBUM, *Spin.*

1. *Stilbum splendidum*, *Fabr. Syst. Piez.* p. 170. 1.

Hab. Aru; Senegal; Java; Bengal.

2. *Stilbum amethystinum*, *Fabr. Syst. Piez.* p. 176. 32.

Hab. Aru; Australia.

Fabricius includes this insect in the genus *Chrysis*; the typical specimen, however, proves that it belongs to the more modern genus *Stilbum*: it is very distinct from *S. splendidum*, being much more strongly and coarsely punctured; and the teeth which arm the apical segment are differently disposed on the margin.

Fam. TENTHREDINIDÆ, *Leach*.

Gen. ORYSSUS, *Fabr.*

1. *ORYSSUS MACULIPENNIS*. *O. niger, punctatus*; pedibus ferrugineis; alis fuscis fasciâ hyalinâ ante cellulam marginalem sitâ.

Female. Length $5\frac{1}{2}$ lines. Black; the head rugose, the front coarsely so, with a row of transverse tubercles running from the vertex along the inner orbits of the eyes, and crossing the front at half their length; the cheeks with a cinereous down, and a line of silvery-white pubescence or down, along the outer orbits of the eyes. Thorax coarsely punctured; the mesothorax with a central longitudinal smooth elevation; wings fuscous, with a broad transverse hyaline fascia before the base of the marginal cell, the tips of the wings hyaline; the legs ferruginous, with the coxæ and trochanters black; the posterior tibiæ with a double row of serrations outside. Abdomen shining and closely punctured; the base and apex coarsely so.

Hab. Aru.

Gen. XYPHIDRIA, *Latr.*

1. *XYPHIDRIA RUFIPES*. *X. nigra*; mandibulis, antennarum scapo, pedibusque ferrugineis; alis hyalinis et iridescentibus.

Female. Length 4 lines. Black and shining; the vertex highly polished; the front from the posterior ocelli forwards closely punctured and opaque; the mandibles, scape, and basal joint of the flagellum ferruginous. The thorax anteriorly punctured and opaque, posteriorly shining, and with a few punctures at the base of the scutellum; wings hyaline and iridescent, the nervures black, the extreme base of the wings and the

tegulae pale testaceous; the legs pale ferruginous, with the claws of the tarsi darker. Abdomen: the base of the segments depressed and very delicately and closely punctured, subopaque; the apical half highly polished and shining; beneath obscurely rufo-piceous.

Hab. Aru.

Gen. TREMEX, *Jurine*.

1. TREMEX INSIGNIS. *T. nigro-purpureus*; abdominis fasciis basalibus albis; alis nigris cupreo nitentibus.

Female. Length 11 lines. Obscure steel-blue, with shades of green, purple, and violet; the head and thorax punctured; the prothorax with an oblique smooth shining space on each side; the wings very dark brown, with a brilliant coppery effulgence. The base of the abdomen opaque, velvety, purple-black; the first segment with a transverse cream-coloured fascia in the middle, the second very slightly whitish at its base; the rest of the abdomen is highly polished, and has a scattered, short, black pubescence.

Hab. Aru.

Note on Two Insect-products from Persia.

By DANIEL HANBURY, Esq., F.L.S.

[Read December 16th, 1858.]

IN the month of June last, my friend Professor Guibourt, of Paris, laid before the Académie des Sciences* some account of a remarkable substance called *Tréhala*, the cocoon of a Curculionidous insect found in Persia, where, as well as in other parts of the East, it enjoys some celebrity as the basis of a mucilaginous drink administered to the sick.

Specimens of this substance, as well as of another insect-product of Persia, together with the insects themselves, were presented a few years ago to the British Museum by W. K. Loftus, Esq., who obtained them while engaged by the British Government on the question of the Turco-Persian boundaries.

The precise determination of the species of these insects being a matter of doubt, they have at my request been lately examined by M. Jekel, of Paris, an entomologist with whom the family of *Curculionidae* has long been an especial study. One of these insects M. Jekel has identified with a species of wide distribution; the other proving undescribed, he has drawn up a description of it, which, accompanied by a figure, I have the honour to lay before the Linnean Society. To this, I venture to add a few observations upon the productions to which I have alluded.

* Comptes Rendus, 21 Juin, 1858, p. 1213.

The first of these is *Tréhala* or *Tricala*, under which name it formed part of the Collection of *Materia Medica* sent by M. Della Sudda, of Constantinople, to the Paris Exhibition of 1855, and since deposited in the *Ecole de Pharmacie* in Paris.

Tréhala (fig. 2) consists of cocoons of an ovoid or globular form, about $\frac{1}{2}$ of an inch in length; their inner surface is composed of a smooth, hard, dusky layer, external to which is a thick, rough, tuberculated coating of a greyish-white colour and earthy appearance. Some of the cocoons have attached to them the remains of the tomentose stalk of the plant upon which they were formed; others have portions of a tomentose spiny leaf built into them; and, more rarely, one finds portions of the flowering heads of the plant, a species of *Echinops*, similarly enclosed. Many of the cocoons are open at one end and empty; others have a longitudinal aperture, originally closed by the stalk of the plant, and still contain the insect; a few are entirely closed. Specimens of this insect, extracted from the cocoons sent to Paris, were examined in 1856 by my friend Mr. W. Wilson Saunders, who pronounced them to be *Larinus maculatus* of Faldermann,—a determination also arrived at by M. Jekel from specimens presented by Mr. Loftus to the British Museum. Respecting these latter, one of which is represented in fig. 1, M. Jekel makes the following remarks:—

“*LARINUS MACULATUS*, Faldermann, *Faun. Transcauc.* ii. p. 228, 449, tab. 6. f. 10, et iii. p. 198.—Schönh. *Gen. et Sp. Curcul.* iii. p. 112 et vii. 2. p. 7.—Hochkuth, *Bull. Moscou*, 1847, No. 2. p. 538 (var. γ).

“Var. γ . *Larin. Onopordinis*, Sch. *loc. cit.* iii. p. 111 (excl. synon.).

“Of this species, Mr. Loftus captured several specimens, all of small size: from some of them the pollinosity had been rubbed off, as is represented in the figure by Mr. Ford (*vide* fig. 1), which shows only a part of the inferior layer of tomentum and the greyish ground of the dorsal and lateral maculæ; the latter, being the most densely coloured in fresh specimens, are always the most persistent. These belong to Schönherr's var. γ , which that author formerly regarded as the *Larinus Onopordinis*, Fabr. Others of Mr. Loftus's specimens, which are very fresh, belong to var. β ; none to the typical variety, which is often larger in size.

“This species has a very extended habitat: I have received it from European Turkey (Frivaldski), Beyrouth, Caucasus, Persia (Dupont), &c. &c.; and it is recorded by Schönherr as also found in Barbary and Portugal.

“This is the insect which proceeds from the rough chalky-looking nidus figured by Mr. Ford. (*Vide* fig. 2)”

The entomological question being so far disposed of, I may be permitted a few remarks upon the properties which have obtained for *Tréhala* a place among drugs and dietetic substances.

The first author who gives any account of the substance is Father Ange, who, in his 'Pharmacopœa Persica*,' describes it in the following terms:—"Est autem istud medicamentum veluti *tragea* ex nucleo pistacii integro confecta; nam revera saccharum istud exterius corrugatum et agglomeratum adhæret cuidam nucleo, in quo non fructus, sed vermiculus quidam nigricans Persice *C-hezoukek* bombycis instar reconditur et moritur."

Father Ange also states that the substance is called in Persian *Schakar tigel* (شکر تیغال), literally *Sugar of nests*; but his Arabic names, *Schakar el ma-ascher* (شکر المعشر) and *Saccar el aschaar*, apply to an entirely different substance, namely to a saccharine matter exuded, after the punctures of an insect, from the stems of *Calotropis procera*, R. Br.†, of which plant he gives a quaint but tolerably characteristic description.

Mr. Loftus, who obtained the specimens which he presented to the British Museum, at Kirrind in Persia, in September, 1851, gives as the Persian name of the cocoons *Shek roukeh*—a term, probably, the same as the "*C-hezoukek*" (a misprint?) of Father Ange, but the signification of which I have not been able to discover.

Another notice of the same substance, with a figure, is briefly given in Dr. Honigberger's 'Thirty-five Years in the East' (Lond. 1852, vol. ii. pp. 305-6), where we read that *Manna teeghul* or *Shukure teeghal*, which are certain insect-nests of a hard texture, rough on the outside, smooth within, about half an inch in length, and of a whitish colour, are imported into Lahore from Hindostan.

M. Bourlier published in 1857 an interesting note on the same substance‡, which has been followed by M. Guibourt's commu-

* *Pharmacopœa Persica ex idiomate Persico in Latinum conversa.* Lutet. Paris., 1681, p. 361.

† This saccharine substance is noticed by Avicenna as *Zuccarum alhusar* (Lib. ii. Tract. ii. cap. 756, ed. Valgr. Venet. 1564), and also by Matthioli (Comm. in Lib. ii. Diosc. cap. 75). It is likewise referred to by Endlicher (Enchiridion Botanicum, p. 300), Royle (Illustr. of the Bot. of the Himalayan Mountains, vol. i. p. 276), Merat and De Lens (Diet. de Matière Médicale, t. i. p. 467), &c.

‡ *Revue Pharmaceutique* de 1856, par Dorvault, p. 37.

nication to the Académie des Sciences, and still later by a memoir on the chemical history of Tréhala, by M. Marcellin Berthelot, also presented to the Academy*.

From the investigations of M. Guibourt, it appears that the cocoons are composed of a large proportion of starch (identical with that found in the stem of the *Echinops*, upon which the insect forms its nest), of gum, a peculiar saccharine matter, a bitter principle, besides earthy and alkaline salts.

The saccharine principle, which has been especially examined by M. Berthelot, and named by him *Tréhalose*, is a body analogous to cane-sugar, but possessing distinctive properties, which separate it from that and all other varieties of sugar.

M. Bourlier states that *Tréhala*, which is abundant in the shops of the Jew drug-dealers of Constantinople, is frequently used by the Arab and Turkish physicians in the form of a decoction, which is regarded by them as of peculiar efficacy in diseases of the respiratory organs.

The second insect-product to which I would draw attention, is a saccharine substance resembling dark honey. Mr. Loftus, who obtained it near Kirrind, 13th July, 1851, and whose specimen is in the British Museum, states that it is exuded from a species of thistle when pierced by a Rhynchophorous insect; but he fails to inform us for what purposes it is used by the inhabitants.

Mr. Loftus having also presented the Museum with excellent specimens both of the plant and insect, I am able to state that the former is *Echinops persicus*, Fisch., and the latter a new species of *Larinus*, to which M. Jekel has applied the name *Larinus mellificus*, and of which he has drawn up the following description:—

“*LARINUS MELLIFICUS*, Jekel (fig. 3). Breviter ovatus, convexus, niger, nitidus; infra subtiliter, lateribus thoracis margineque elytrorum intus medio versus angulariter ampliata, apicem occupante griseo-cinereascenti tomentosis; rostro leviter punctato, basi utrinque bicanaliculato cum elevatione media lata subcariniformi; thorace subconico antice tubulato, supra confertim sat rude punctato, lateribus subrugoso; elytris striato-punctatis, interstitiis latis, planis, transversim subtilissime rugulosis, cum abdomine tenuissime alutaceis, punctis majoribus remotioribus impressis; pectore, lateribus, pedibusque rugoso-punctatis, femoribus infra fortiter oblique costatosis; tibiis intus, anticis fortius crenulatis. Long. (rostr. excl.) 16–18, lat. elytr. 8–9 mill.

* *Comptes Rendus*, 28 Juin 1858, p. 1276.

"Patria—Persia, prope Kirrind, ubi *Echinopsidis* speciem frequentat, cujus plantæ caules ab hoc insecto puncti materiam quamdam saccharinam sudant." *W. K. Loftus*, Mus. Brit.

Very similar to *L. Onopordinis*, but proportionably more elongate and less convex; rostrum and thorax longer; pilosity of

Fig. 1.

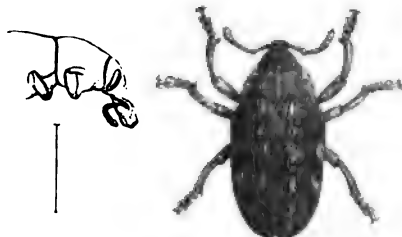

Larinus maculatus, Faldern.

Fig. 2.

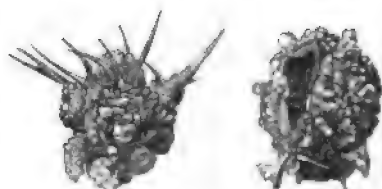
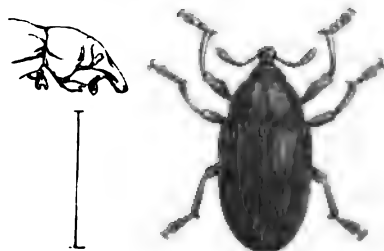

The cocoons of *Larinus maculatus*, called in Turkish *Tráhala*.

Fig. 3.


Larinus melliflous, Jekel.

the body underneath much thinner and shorter; thighs thicker, more clavate, the anterior evidently costate-rugose underneath; without whitish marks on the elytra, and without that layer of light-brown earth-like pollinose transudation which is often wanting in rubbed specimens of *Larinus Onopordinis*. The freshest

specimens have the griseous margin of the elytra, which parts from the base under the shoulder, obliquely and angularly ampliate interiorly towards the middle, where it reaches the second stria. This griseous pilosity fills all the tips of the elytra, leaving bare only the sutures, an angular notch behind the middle (which forms with that apical part of the suture a kind of hook on each elytron), and two round spots, one submarginal fronting the tip of the notch, the other larger, discoidal, behind the foot of the notch, much above the tip.

Catalogue of the Heterocerous Lepidoptera collected at Singapore by Mr. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER, Esq., F.L.S.

[Read Feb. 17, 1859.]

Fam. URANIIDÆ, *Westwood*.

Gen. NYCTALEMON, *Dalman*.

1. *Nyctalemon Hector*, *White*, *Walk. Cat. Lep. Het.* vii. 1771.

Inhabits also Borneo.

Fam. AGARISTIDÆ, *Swainson*.

Gen. EUSEMIA, *Dalman*.

2. *Eusemia maculatrix*, *Westwood*, *Cat. Orient. Ent.* 67, pl. 33. f. 1.

Inhabits also Hindostan and Java.

3. *Eusemia mollis*, *Walk. Cat. Lep. Het.* vii. 1774.

Inhabits also Hindostan.

Fam. ZYGÆNIDÆ, *Leach*.

Gen. SYNTOMIS, *Illiger*.

4. SYNTOMIS ANNOSEA, n. s. *Fam.* Cinereo-fusca; capite, antennis apice, humeris abdominisque maculis lateralibus albis; alis maculis quatuor vitreis.

Female. Cinereous brown. Head white. Antennæ serrated, white towards the tips. Thorax with a large white spot on each side in front. Abdomen somewhat compressed towards the base, with white spots along each side. Wings long, with the discal areolets from the base to beyond the middle mostly vitreous, but having the veins bordered with brown. Length of the body 9 lines; of the wings 22 lines.

5. SYNTOMIS CHLOROLEUCA, n. s. *Fam.* Nigro-viridis; fronte, antennis apice, humeris abdominisque fasciis duabus dorsalibus fasci-

isque ventralibus albis; alis purpureo-nigris, anticis maculis quatuor vitreis, posticis macula una vitrea.

Female. Blackish-green. Front, antennæ towards the tips, and two humeral spots white. Antennæ simple. Abdomen with a white band at the base, and with another on the fifth segment, and with white ventral bands. Wings purplish-black; fore wings with four vitreous spots; the fore one of the interior pair not one-third of the size of the hind one, which is very long; the fore one of the exterior pair much narrower than the hind one, and accompanied at its inner end by an elongated vitreous point; hind wings with an elongated vitreous spot. Length of the body $4\frac{1}{2}$ lines; of the wings 12 lines.

6. *SYNTOMIS XANTHOMELA*, n. s. *Mas.* Nigra; fronte, thoracis margine antico abdominisque fasciis ochraceis; antennis apice albis, abdominis fasciculo pallide cinereo; alis anticis maculis quinque vitreis, posticis maculis duabus vitreis.

Male. Black. Front, fore borders of the thorax and hind borders of the abdominal segments ochraceous; dorsal tuft pale cinereous, rather large. Antennæ simple, white towards the tips. Fore wings with five vitreous spots, of which the basal one is small and round, and the other four large and elongated; the exterior pair intersected by the black veins. Hind wings with two vitreous spots, of which one is basal and the other discal. Length of the body 4 lines; of the wings 9 lines.

Fam. LITHOSIIDÆ.

Gen. NYCTEMERA, *Hübner*.

7. *NYCTEMERA MUNDIPICTA*, n. s. *Mas et Fem.* Fusca; capite thoraceque albo vittatis; abdomine albo guttis dorsalibus fuscis; alis anticis basi albo venosis, fascia exteriori obliqua postice abbreviata alba, posticis albis fusco marginatis. *Flem.* Thorace fascia postica lutea, abdomine fusco fasciis albis; alis anticis fascia latiore vix abbreviata.

Male. Brown. Head and thorax with white lines. Antennæ moderately pectinated. Pectus with black spots, luteous on each side. Abdomen white, with brown dorsal dots; tip luteous. Legs white. Fore wings with white veins towards the base, and with an exterior oblique white band, which is narrower hindward, and ends at some distance from the interior border. Hind wings white, with a broad brown border. *Female?* Larger. Antennæ slightly pectinated. Thorax with a slight luteous band in front, and another hindward. Abdomen brown, with a white band on the hind border of each segment; under side white, with brown spots along each side. Fore wings with the band much broader, hardly straightened hindward, and ending very near the interior border. Length of the body 5-6 lines; of the wings 16-20 lines.

Gen. *CYCLOSLIA*, *Hübner*.

8. *CYCLOSLIA SUBMACULANS*, n. s. *Mas.* Nigra, velutina, squamis nonnullis cyaneis, subtus albo cyaneoque fasciata; alis anticis purpureo-nigris, punctis paucis exterioribus, alis posticis fuscis, punctis submarginalibus albis; alis quatuor subtus fuscis, guttis exterioribus et submarginalibus albis.

Male. Black, with a few metallic blue specks, and with metallic bluish-white pectoral spots and ventral bands. Antennæ slightly pectinated. Wings velvety, rather long, brown beneath, with an exterior and a submarginal row of white dots; fore wings purplish-black, with a few exterior and submarginal white points; hind wings brown, with submarginal white points. Length of the body 9 lines; of the wings 28 lines.

9. *CYCLOSLIA NIVIPETENS*, n. s. *Mas.* Cinereo-nigra; antennis cyaneo-nigris subpectinatis; alis anticis fascia lata submarginali alba.

Male. Cinereous-black. Antennæ bluish-black. Fore wings with a broad, submarginal, upright, white band, which is much narrower hindward, and is intersected by the black veins. Length of the body 7 lines; of the wings 22 lines.

Gen. *PIDORUS*, *Walk.*

10. *PIDORUS CONSTRICTUS*, n. s. *Mas.* Cyaneo-niger, subtus testaceus; antennis pectinatis corpore vix brevioribus; thoracis margine antico coccineo; alis angustis, anticis fascia exteriore subrecta subobliqua flavo-alba, posticis cinereo-nigris.

Male. Bluish-black, testaceous beneath. Antennæ moderately pectinated, hardly shorter than the body. Thorax crimson along the fore border. Wings narrow, somewhat testaceous beneath towards the base; fore wings with a slightly oblique, hardly curved, yellowish-white exterior band; hind wings cinereous-black. Length of the body 5 lines; of the wings 16 lines.

Gen. *HYPSA*, *Hübner*.

11. *Hypsa silvandra*, *Cram. Pap. Exot.* iv. 155, pl. 369. f. D (*Phalæna*). Inhabits also Hindostan, China, and Australia.

12. *Hypsa egea*, *Walk. Cat. Lep. Het.* 11. 453. 12. Inhabits also Hindostan and Java.

Gen. *SETINA*, *Schranck*.

13. *SETINA BIPUNCTATA*, n. s. *Mas.* Flava; alis anticis punctis duobus basalibus guttaque discali nigris.

Male. Yellow, closely allied to *S. apicalis* (*Cat. Lep. Het.* 521). Fore wings black along the costa towards the base, where there are two

black points; a small black dot at the tip of the discal areolet. Hind wings a little paler than the fore wings. Length of the body 3 lines; of the wings 8 lines.

Gen. BIZONE, *Walk.*

14. *Bizone hamata*, *Walk. Cat. Lep. Het.* 88. 5493.

Inhabits also China.

Gen. DEIOPEIA, *Stephens.*

15. *DEIOPEIA DETRACTA*, n. s. *Fem.* Pallide lutea; thorace guttulis nigris; alis sat angustis nigro guttatis, fimbria pallida nitente; alis anticis nigro transverse quadrigatis.

Female. Pale luteous. Thorax with six black dots. Wings narrower than in the other species of this genus, with black dots, of which the most part are towards the exterior border, where they form two irregular lines, and are somewhat confluent on the under side; fringe whitish, shining. Fore wings with four short transverse various black streaks, of which the first and the second form an interrupted line. Length of the body 5 lines; of the wings 14 lines.

Gen. DARANTASIA, n. g.

Fem. *Corpus* sat robustum. *Proboscis* distincta. *Palpi* porrecti, breves, caput non superantes; articulus tertius longiconicus, acutus, secundi dimidio non longior. *Antennæ* setaceæ, simplices, gracillimæ. *Abdomen* subconicum, alas posticas superans; sexualia sat magna. *Pedes* breves, nudi, sat validi, calcaribus robustis sat longis. *Alæ* breviusculæ, sat angustæ; anticæ apud costam convexæ, apice rotundatæ, margine exteriori perobliquo.

Allied to *Lemyra* (*Cat. Lep. Het.* vii. 1690).

Female. Body rather stout. Proboscis moderately long. Palpi porrect, short, not extending beyond the head; third joint elongate-conical, acute, about half the length of the second. Antennæ setaceous, simple, very slender, full half the length of the body. Abdomen nearly conical, extending somewhat beyond the hind wings; anal appendages rather large. Legs short, bare, rather stout; spurs stout, rather long. Wings rather short and narrow; fore wings convex along the costa, rounded at the tips, extremely oblique along the exterior border.

16. *DARANTASIA CUNEIFLENA*, n. s. *Mas.* Nigra; corpore subtus, capite, thoracis fasciis duabus anticis maculaque postica abdominisque fasciis posticis luteis; pedibus luteis, tibiis supra nigris; alis anticis luteo octo-strigatis, posticis luteo strigatis.

Male. Black, mostly luteous beneath. Head luteous. Thorax with two luteous bands in front, and with a luteous spot hindward. Abdomen with luteous bands hindward. Legs luteous; tibiæ black above. Fore wings with eight wedge-shaped luteous streaks, of

which three are near the base, two subcostal, two hindward, and one submarginal and transverse. Hind wings with three luteous streaks, of which the first and second are connected exteriorly, and the third is short, broad, and submarginal. Length of the body $3\frac{1}{2}$ lines; of the wings 8 lines.

Fam. LIPARIDÆ, *Boisduval*.

Gen. ARTAXA, *Walk*.

17. ARTAXA VARIANS, *Walk. Cat. Lep. Het. iv. 796*.

Inhabits also West Africa, Hindostan, and China.

Gen. PANTANA, *Walk*.

18. PANTANA BICOLOR, *Walk. Cat. Lep. Het. iv. 820*.

Note.—*P. dispar*, a native of Hindostan, and *P. ampla*, a native of China, may be varieties of this species.

Fam. NOTODONTIDÆ, *Stephens*.

Gen. DARABITTA, n. g.

Fam. Corpus vix robustum. Proboscis brevis. Palpi longiusculi, oblique ascendentes, non pilosi. Antennæ validæ, subcompressæ, breviusculæ, simplices. Abdomen conicum, alas posticas non superans. Pedes squamosi, læves, breviusculi, sat graciles, calcaribus longis. Ala latiusculæ, non longæ; anticæ apud costam rectæ, apice subrotundatæ, margine exteriori vix convexo.

This genus hardly belongs to the *Notodontidæ*; but its precise situation seems to be uncertain. *Female*. Body hardly stout. Proboscis short. Palpi rather long and slender, not pilose, obliquely ascending, rising a little higher than the vertex; third joint elongate-conical, less than half the length of the second. Antennæ stout, bare, slightly compressed, little longer than the thorax; joints few. Abdomen conical, not extending beyond the hind wings. Legs squamous, smooth, rather short and slender; spurs long. Wings rather broad, not long: fore wings straight along the costa, slightly rounded at the tips; exterior border hardly convex, very slightly oblique.

19. DARABITTA STRIGICOSTA, n. s. *Fam. Rufa, vix cinerascens; alis anticis linea submarginali e punctis nigris, lineolis tribus costalibus obliquis albis, prima angulata, secunda tertique connexis.*

Female. Red, with a slight cinereous tinge, more cinereous beneath. Antennæ pale. Fore wings with three white oblique costal streaks; first streak forming an outward angle; second connected in the disk with the third, which is oblique in the contrary direction; a row of submarginal black points. Length of the body 3 lines; of the wings 8 lines.

Fam. LIMACODIDÆ, *Duponchel*.Gen. MIRESA, *Walk*.

20. *MIRESA CURVIFERA*, n. s. *Mas.* Rufa, crassa, brevis; antennis late pectinatis; alis anticis linea exteriore arcuata nivea, spatio contiguo exteriore obscuriore.

Male. Red, thick, short. Palpi porrect, extending a little beyond the head. Antennæ shorter than the thorax, broadly pectinated except towards the tips. Abdomen short, obtuse, not extending beyond the hind wings. Legs short. Wings not broad. Fore wings straight along the costa, rounded at the tips, darker on the exterior side of a curved transverse bright white line, which is somewhat beyond the middle; exterior border rather oblique. Hind wings a little paler than the fore wings. Length of the body $4\frac{1}{2}$ lines; of the wings 12 lines.

Fam. SATURNIIDÆ, *Walk*.Gen. ATTACUS, *Linn*.

21. *ATTACUS ATLAS*, *Linn. Syst. Nat.* 808.

Inhabits also Hindostan, Ceylon, China, and Borneo.

Fam. BOMBYCIDÆ.

Gen. BOMBYX, *Linn*.

22. *BOMBYX SUBNOTATA*. *Mas.* Ferruginea, crassa; antennis late pectinatis; abdominis apice lamine lateralibus fimbriatis; alis anticis margine exteriore subundulato subexciso, macula subtus costali subapicali flava.

Male. Ferruginous, thick, pilose. Mouth obsolete. Antennæ broadly pectinated. Abdomen much more slender than the thorax, not extending beyond the hind wings; anal lateral appendages fringed. Legs short, stout. Fore wings rounded at the tips, extremely oblique along the exterior border, which is slightly angular in the middle and slightly excavated on each side; under side with a yellow costal spot near the tip. Hind wings with the interior border densely fringed towards the tip. Length of the body 7 lines; of the wings 16 lines.

Fam. LEUCANIDÆ, *Guénée*.Gen. MYTHIMNA, *Hübner*.

23. *MYTHIMNA INDUCENS*, n. s. *Fam.* Lateritio-rufa, subtus albida; palporum articulo tertio brevissimo; abdomine rufescenti-cano; alarum anticarum puncto discali nigro, lineis duabus nigricantibus subarcuatis indistinctis, alis posticis rufescenti-canis.

Female. Brick-red colour, mostly whitish beneath. Palpi obliquely ascending, not rising to the height of the vertex; third joint extremely small, less than one-sixth of the length of the second. Abdomen reddish-hoary, extending but little beyond the hind wings. Legs stout, squamous; spurs moderately long. Fore wings very slightly convex along the costa, rectangular at the tips; exterior border slightly oblique, nearly straight; two slender, indistinct, slightly curved, blackish lines, having between them a more distinct black discal point. Hind wings reddish-hoary, the reddish tinge most prevalent towards the exterior border. Length of the body 7 lines; of the wings 18 lines.

Fam. GONOPTERIDÆ, *Guénée*.

Gen. ANOMIS, *Hübner*.

24. ANOMIS MUTILATA, n. s. *Mas.* Rufa, robusta, subtus rufescenticinerea; palpis longis subascendentibus; abdomine latiusculo; alarum anticarum lineis tribus indistinctis angulosis nigricantibus, orbiculari alba punctiformi, margine exteriori postico perobliquo subexcavato.

Male. Red, stout, reddish cinereous beneath. Palpi long, obliquely ascending; third joint slender, linear, obtuse at the tip, a little shorter than the second. Antennæ stout, with extremely short setæ. Abdomen rather broad, extending a little beyond the hind wings. Fore wings with three blackish, indistinct, slightly diffuse, zigzag lines, which are slightly bordered hindward with pale yellow; orbicular mark white, punctiform; exterior border slightly angular, hardly oblique, and slightly truncated on the fore half, extremely oblique and with two slight excavations on the hind half; fringe partly white. Hind wings not paler than the fore wings. Length of the body 7 lines; of the wings 18 lines.

Gen. THALATTA, *Walk.*

25. *Thalatta aurigutta*, *Walk. Cat. Lep. Het.* xv. 1793.

Fam. HYPOGRAMMIDÆ, *Guénée*.

Gen. BRIARDA, *Walk.*

26. BRIARDA PLAGIFERA, n. s. *Mas.* Ferrugineo-cinerea; capite thoraceque antico nigricantibus; tibiis ciliatis; alis sat angustis subdenticulatis, anticarum fascia basali, macula discali maculaque costali exteriori nigricantibus, lineis exteriori et submarginali fuscis duplicatis denticulatis subnebulosis; alis posticis pallide cinereis, semihyalinis, fusco latissime marginatis.

Male. Cinereous, tinged with ferruginous. Head and fore part of the thorax blackish. Palpi obliquely ascending; third joint linear, conical

at the tip, about half the length of the second. Antennæ hardly setose. Abdomen extending a little beyond the hind wings. Legs rather stout; tibiæ fringed; spurs very long. Wings rather narrow, slightly denticulated. Fore wings slightly rounded at the tips, very oblique along the exterior border; a blackish band near the base, abbreviated hindward; a large blackish spot on the reniform mark, and a diffuse blackish spot near the tip of the costa; exterior and submarginal lines brown, double, denticulated, with the space along their borders somewhat clouded. Hind wings pale cinereous, semi-hyaline, with very broad brown borders. Length of the body 9 lines; of the wings 22 lines.

Fam. CATEPHIDÆ, *Guénée*.

Gen. STEIRIA, *Walk.*

27. STEIRIA PHRYGANEOIDES, n. s. *Mas.* Pallide cinerea, rufescente conspersa; palpis longis vix ascendentibus; alis sat angustis denticulatis; alarum anticarum squamis nonnullis nigris fuscisque, marginibus exteriore et interiore non conspersis, reniformi magna; alis posticis pallide cinereis, fusco late marginatis.

Male. Pale cinereous, thickly speckled with ferruginous red. Palpi long, hardly ascending, almost straight; third joint linear, obtuse at the tip, rather shorter than the second. Antennæ bare. Abdomen conical, extending rather beyond the hind wings; apical tuft small. Legs rather long and slender, almost bare; spurs very long. Wings rather narrow; exterior border denticulated. Fore wings with the speckles mostly confluent in the disk, mostly wanting along the interior and exterior borders; several black and brown speckles, some of which border the large reniform mark. Hind wings pale cinereous, with a broad brown border. Length of the body 8 lines; of the wings 20 lines.

Fam. OPHIDERIDÆ, *Guénée*.

Gen. OPHIDERES, *Boisduval*.

28. Ophideres Salaminia, *Cram. Pap. Exot.* 71. 117, pl. 174. fig. A. Inhabits also Hindostan, Ceylon, Java, and China.

29. Ophideres discrepans, *Walk. Cat. Lep. Het.* xiii. 1227.

30. Ophideres smaragdipicta, *Walk. Cat. Lep. Het.* xiii. 1229.

Fam. PHYLLODIDÆ, *Guénée*.

Gen. LYGNIODES, *Guénée*.

31. Lygniodes endoleuca, *Guén. Noct.* iii. 124.

Inhabits also Java.

Fam. EREBIDÆ, *Guénée*.Gen. SYPNA, *Guénée*.

32. *Sypna subsignata*, *Walk. Cat. Lep. Het.* xiv. 1261.

Fam. OMMATOPHORIDÆ, *Guénée*.Gen. PATULA, *Guénée*.

33. *Patula macrops*, *Linna. Syst. Nat.* 225 (Noctua).

Inhabits also West and South Africa, Madagascar, Hindostan, and Ceylon.

Gen. ARGIVA, *Hübner*.

34. *Argiva hieroglyphica*, *Drury, Ins. Exot.* 11. 3, pl. 2. f. 1 (Noctua).

Inhabits also Madagascar, Hindostan, and Ceylon.

Fam. OPHIUSIDÆ, *Guénée*.Gen. CÆCILA, *Walk.*

35. *Cæcila complexa*, *Walk. Cat. Lep. Het.* xv. 1825.

Gen. OPHISMA, *Guénée*.

36. *Ophisma Umminia*, *Cram. Pap. Exot.* 111. 137, pl. 267. f. 7 (Noctua).

Inhabits also Java and Sumatra.

Gen. ACHÆA, *Hübner*.

37. *Achæa mercatoria*, *Fabr. Ent. Syst.* 111. 2, 62. 175. (Noctua).

Inhabits also Hindostan and Java.

Fam. THERMESIDÆ, *Guénée*.Gen. THERMESIA, *Hübner*.

38. *THERMESIA? RECUSATA*, n. s. *Mas.* Rufescenti-cinerea, robusta, nigricante conspersa, capite thoraceque antico fuscis; palpis longissimis ascendentibus subarcuatis; antennis subsectosis, alis linea exteriore recta obliqua nigricante extus diffusa, linea interiore tenui subarcuata nigricante, linea submarginali e punctis lineaque marginali nigris.

Male. Reddish cinereous, stout, with blackish speckles. Head and fore part of the thorax brown. Frontal tuft acute. Palpi very long, slightly curved, nearly vertical; third joint linear, acute, shorter than the second. Antennæ slightly setose. Abdomen hardly extending

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beyond the hind wings. Wings with the speckles here and there confluent; lines blackish; interior line slender, slightly curved; exterior line straight, oblique, diffuse on the outer side, extending almost to the tips of the fore wings; submarginal line represented by points; marginal line slightly undulating. Fore wings rectangular at the tips; exterior border slightly bent; its fore part not oblique; orbicular and reniform marks indistinct. Length of the body 6 lines; of the wings 16 lines.

Gen. *HYPERNARIA*, *Guénée*.

39. *HYPERNARIA DIFFUNDENS*, n. s. *Fem.* Cinerea, robusta, fusco conspersa; palporum articulo secundo extus fusco, tertio aciculari longissimo, alarum lineis interiore et exteriori vagis dentatis lineaque media recta sat obliqua squamis fuscis, punctis marginalibus atris, alis anticis acutis, orbiculari punctiformi atra, litura reniformi angusta fusco marginata extus excavata.

Female. Cinereous, stout, speckled with brown. Palpi very slightly curved; second joint brown on the outer side; third acicular, a little shorter than the second. Antennæ minutely setose. Abdomen not extending beyond the hind wings. Wings with the interior and exterior lines angulose, diffuse, composed of brown speckles; middle line more oblique, straight, slender, double, obsolete towards the costa of the fore wings, bordered with diffuse angular streaks of brown speckles; marginal points deep black. Fore wings acute; orbicular mark black, punctiform; reniform narrow, brown, bordered, excavated on the outer side; exterior border slightly convex. Length of the body 10 lines; of the wings 22 lines.

Gen. *UGIA*, *Walk.*

40. *Ugia diajungens*, *Walk. Cat. Lep. Het.* xv. 1860.

Fam. *PLATYDIDÆ*, *Guénée*.

Gen. *MASCA*, *Walk.*

41. *Masca abactalis*, *Walk. Cat. Lep. Het.* xvi. 9.

Fam. *HYPENIDÆ*, *Herr.-Schäffer*.

Gen. *HYPENA*, *Schrank*.

42. *Hypena ruralis*, *Walk. Cat. Lep. Het.* xvi. 65.
Inhabits also Ceylon.

Gen. *MACNA*, *Walk.*

43. *Macna pomalis*, *Walk. Cat. Lep. Het.* xvi. 78.

Fam. MARGARODIDÆ, Guénée.

Gen. MARGARODES, Guénée.

44. *Margarodes Amphitritalis*, Guén. *Delt. et Pyral.* 307, 327.

Inhabits also Hindostan.

Gen. NEURINA, Guénée.

45. *Neurina Procopialis*, *Cram. Pap. Exot.* iv. 152, pl. 368. f. E. (*Phalena Pyralis Procopia*.)

Inhabits also Hindostan and Java.

Fam. ENNOMIDÆ, Guénée.

Gen. BULONGA, n. g.

Corpus gracile. Proboscis brevissima. Palpi breves, porrecti, angulati. Antennæ simplices. Abdomen conicum. Pedes graciles, nudi, calcariibus non longis, tibiis anticis brevissimis. Alæ sat latæ; anticæ acutæ, margine exteriore sat obliquo; posticæ abdomen superantes.

Body slender. Proboscis very short. Palpi as long as the breadth of the head; second joint obliquely ascending; third porrect, rather shorter than the second, with which it forms an obtuse angle. Antennæ simply filiform. Abdomen conical. Legs slender, bare; spurs rather short; fore tibiæ very short. Wings rather broad; fore wings rectangular at the tips; costa hardly convex; exterior border rather oblique. Hind wings with the interior angle prominent, acute.

46. *BULONGA SCHIETACEARIA*, n. s. *Fam.* Glauco-cinerea, alis nitentibus, linea marginali nigra fimbria interlineata, anticis fusco quadrilineatis, posticis trilineatis.

Female. Glauco-cinereous, paler beneath. Head and palpi reddish. Wings shining; marginal line black; fringe pale cinereous, including a darker line. Fore wings with four straight oblique brown lines; second line broader than the first, apparent also on the hind wings; third narrower and darker than the others, blackish, and still more distinct on the hind wings, where it is bordered with whitish on the outer side; fourth more indistinct than the others, still more indistinct on the hind wings. Length of the body 6 lines; of the wings 16 lines.

Fam. AMPHIDASYDÆ, Guénée.

Gen. DARISTANE, n. g.

Mas. Corpus robustum. Proboscis brevissima. Palpi validi, breves, obtusi, oblique ascendentes; articulus tertius minimus. Antennæ setaceæ, simplices. Abdomen conicum, alas posticas non superan-

Pedes validi, breviusculi; tibiæ anticæ brevissimæ, posteriores latissimæ, calcaribus longis. *Alæ* breviusculæ, sat latæ; anticæ acutæ.

Male. Body robust. Proboscis very short. Palpi short, stout, obtuse, obliquely ascending; third joint very small. Antennæ setaceous, simple. Abdomen conical, not extending beyond the hind wings. Legs stout, rather short; tibiæ pilosæ; fore tibiæ very short; posterior tibiæ very broad, especially the middle pair. Wings rather short, moderately broad. Fore wings straight along the costa, acutely rectangular at the tips; exterior border rather oblique.

47. *DARISTANE TIBIARIA*, n. s. *Mas*. Cinerea, nitens, alis nigro conspersis, fascia media rufescente non bene determinata, anticis costa albida nigro punctata.

Male. Cinereous, shining, a little paler beneath. Wings speckled with black; an indistinct oblique reddish middle band; costa of the fore wings whitish, with black points. Length of the body 5 lines; of the wings 12 lines.

Fam. PALLYADÆ, Guénée.

Gen. EUMELEA, Duncan.

48. *Eumelea Rosaliata*, *Cram. Pap. Exot.* iv. 152, pl. 368. f. F. (*Phalæna Geometra Rosalia*.)

Inhabits also Amboyne.

Fam. EPHYRIDÆ, Guénée.

Gen. EPHYRA, Duponchel.

49. *EPHYRA QUADRISTRIARIA*, n. s. *Fem*. Rufescens, subtus flava, alis flavis rufescente conspersis, fascia exteriore perobliqua rufescente, anticis acutis, lituris duabus costalibus obliquis fuscis.

Female. Reddish, yellow beneath. Proboscis short. Palpi short, slightly ascending; third joint linear, obtuse, a little shorter than the second. Antennæ short, stout, setaceous. Abdomen not extending beyond the hind wings. Legs bare, rather long and slender; spurs long. Wings yellow, with reddish speckles, and with a straight reddish band, which extends from beyond the middle of the interior border of the hind wings to the tips of the fore wings. Fore wings acute, with two oblique brown costal marks; exterior border rather oblique. Length of the body 4 lines; of the wings 12 lines.

Gen. ANISODES, Guénée.

50. *ANISODES EXPUNCTARIA*, n. s. *Fem*. Luteo-cervina, palpis longis angulatis, antenna breviusculis, alis ferrugineo subconspersis, linea media fusca undulata valde indistincta, lineis interiore et exteriore e punctis nigris, punctis marginalibus nigris.

Female. Pale luteous fawn colour. Proboscis short. Palpi long, slightly decumbent; third joint a little shorter than the second, with which it forms an obtuse angle. Antennæ simple, short. Wings minutely and indistinctly sprinkled with ferruginous; a brown, diffuse, undulating, very indistinct middle line, which is obsolete in the hind wings; interior and exterior lines indicated by widely separated black points; marginal points black. Fore wings rectangular at the tips; exterior border slightly oblique. Length of the body 6 lines; of the wings 8 lines.

Fam. ACIDALIDÆ, *Guénée*.

Gen. SYNEGIA, *Guénée*.

51. *Synegia botydaria*, *Guén.* *Uran. et Phal.* i. 423. 694.
Inhabits also Borneo.

Gen. DRAPETODES, *Guénée*.

52. *Drapetodes mitaria*, *Guén.* *Uran. et Phal.* i. 424. 695.
Inhabits also Hindostan.

Gen. TIMANDRA, *Duponchel*.

53. *TIMANDRA AJAIA*, n. s. *Mas.* Glaucoscenti-cinerea; antennis setosis, alis linea perobliqua fusca antice abbreviata, linea marginali nigra, anticis valde acutis, reniformi tenui fusca.

Male. Cinereous, with a glaucous tinge. Proboscis short. Palpi very short, obliquely ascending; third joint extremely small. Antennæ setose, somewhat shorter than the body. Wings with a straight, very oblique, brown line, which extends from the middle of the interior border of the hind wings towards the tip of the fore wings, on approaching which it is obsolete; marginal line black. Fore wings very acute; exterior border extremely oblique; reniform mark brown, very slender. Hind wings extending beyond the abdomen. Length of the body 6 lines; of the wings 17 lines.

Gen. ZANCLOPTERYX, *Herr.-Schaeffer*.

54. *Zanclopteryx saponaria*, *Herr.-Schaeffer*, *Guén.* *Uran. et Phal.* 11. 16, 915.
Inhabits also Ceylon.

Fam. MICRONIDÆ, *Guénée*.

Gen. MICRONIA, *Guénée*.

55. *Micronia rectinervata*, *Guén.* *Uran. et Phal.* 11. 27, 933.

Fam. ZERENIDÆ.

Gen. STALAGMIA, *Guénée*.

56. *Stalagmia guttaria*, *Guér. Icon. Regn. Anim. Ins.* pl. 90 (*Phalaena*).
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Catalogue of the Heterocerous Lepidopterous Insects collected at Malacca by Mr. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER.

Fam. SPHINGIDÆ, *Leach*.Gen. MACROGLOSSA, *Ochsenheimer*.

1. *Macroglossa Passalus*, *Drury, Exot. Ins.* ii. 52, pl. 29. f. 2 (*Sphinx*). Inhabits also Hindostan and Java.
2. *Macroglossa corythus*, *Boisd. MSS.*; *Walk. Cat. Lep. Het.* viii. 92. 14. Inhabits also Hindostan, Ceylon, and Java.

Fam. AGARISTIDÆ, *Swainson*.Gen. EUSEMIA, *Dalman*.

3. *Eusemia maculatrix*, *Westw.* (See Singapore Sp. No. 2.)
4. *Eusemia mollis*, *Walk.* (See Singapore Sp. No. 3.)
5. *EUSEMIA SUBDIVES*, n. s. *Mas.* Atræ, antennis subpectinatis, abdomine fasciis luteis, alis anticis fascia exteriore recta non obliqua testacea; posticis ochraceis atro marginatis.
Male. Deep black. Antennæ slightly pectinated, slightly hooked at the tips. Abdomen with a luteous band on the hind border of each segment. Fore wings with an upright, straight, testaceous exterior band, which does not extend to the interior border. Hind wings bright ochraceous, with a deep black border, which is irregular on the inner side and is joined in front to a black spot, the latter, on the under side, containing a white curved line. Length of the body 9 lines; of the wings 28 lines.

Fam. LITHOSIIDÆ, *Stephens*.Gen. NYCTEMERA, *Hübner*.

6. *Nyctemera tripunctaria*, *Linn. Syst. Nat.* 864. 226 (*Geometra*). Inhabits also Hindostan and China.

Gen. EUSCHEMA, *Hübner*.

7. *Euschema subrepleta*, *Walk. Cat. Lep. Het.* xi. 406. 3. Inhabits also Ceylon and Borneo.

Fam. LIPARIDÆ, *Boisduval*.

Gen. PANTANA.

- 8.
- Pantana bicolor*
- ,
- Walk.*
- (See Singapore Sp. No. 17.)

Fam. ORTHOSIDÆ, *Guénéé*.Gen. CAREA, *Walk.*

- 9.
- Carea varipes*
- ,
- Walk. Cat. Lep. Het. x. 475.*

Fam. HYBLÆIDÆ, *Guénéé*.Gen. HYBLÆA, *Fabr.*

- 10.
- Hyblæa tortricoides*
- ,
- Guén. Noct. ii. 391.*

Inhabits also Borneo.

- 11.
- Hyblæa erycinoides*
- ,
- Walk. Cat. Lep. Het. xv. 1792.*

Fam. PHYLLODIDÆ, *Guénéé*.Gen. LYGNIODES, *Guénéé*.

- 12.
- Lygniodes endoleuca*
- ,
- Guén.*
- (See Singapore Sp. No. 30.)

Fam. OPHIUSIDÆ, *Guénéé*.Gen. OPHIUSA, *Ochsenheimer*.

- 13.
- Ophiusa fulvotænia*
- ,
- Guén. Noct. iii. 272. 1710.*

Inhabits also Hindostan, Ceylon, Java, and Sumatra.

Fam. THERMESIDÆ, *Guénéé*.Gen. COTUZA, *Walk.*

14. *COTUZA CONFIRMATA*, n. s. *Mas.* Cinereo-ferruginea, robusta, dense vestita, subtus alba; palpis latis compressis oblique ascendentibus; articulo tertio minimo, antennis plus dimidio basali subpectinatis, alis linea media recta perobliqua nigro-fusca antice angulosa et retracta, linea exteriore e denticulis nigrofuscis albido terminatis, fimbria apice alba, alis anticis subhamatis, linea interiore nigrofusca undulata orbiculari nigra punctiformi, reniformi et litura costali albis nigro marginatis.

Male. Cinereous-ferruginous, stout, densely pilose, white beneath. Palpi broad, compressed, obliquely ascending, not rising higher than the head; third joint obtuse, extremely short. Antennæ slightly pectinated to nearly two-thirds of the length, bare from thence to the tips. Abdomen not extending beyond the hind wings. Legs white;

tibiæ ferruginous above. Wings ample; a blackish brown, straight, very oblique line, which is zigzag, and retracted towards the costa of the fore wings; exterior line composed of blackish-brown, very acute, whitish-pointed angles; fringe white exteriorly. Fore wings slightly hooked, with an interior undulating blackish-brown line; orbicular mark black, punctiform; reniform white, black-bordered, forming a triangular spot and an anterior point; a small exterior white costa, with mark. Length of the body 11 lines; of the wings 28 lines.

Fam. ACIDALIDÆ, *Guénée*.

Gen. ZANCLOPTERYX, *Herr.-Schæff.*

15. *Zanclopteryx saponaria*, *Herr.-Schæff.* (See Singapore Species, No. 54.)

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JOURNAL
OF
THE PROCEEDINGS
OF
THE LINNEAN SOCIETY.

ZOOLOGY.

VOL. IV.

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AND
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1860.

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PROCEEDINGS
OF THE
LINNEAN SOCIETY OF LONDON.

November 4th, 1858.

Thomas Bell, Esq., President, in the Chair.

Robert Chambers, Esq., was elected a Fellow.

Among the presents were the following, for which the special thanks of the Society were directed to be given; viz.—

Linnaeus's MS. Diary and Translation; together with a series of Letters from Linnaeus to Menander, with Translations of many of them. These MSS. were formerly in the possession of the late Dr. Maton, V.P.L.S., and were presented by his niece, Miss Wray.

An extensive Collection of dried Plants, the present portion consisting of about 1000 species, formed in Java by T. Horsfield, Esq., M.D., F.R. & L.S. Presented by the Court of Directors of the Hon. East India Company.

An extensive Collection of Australian and Tasmanian Plants, formed by Dr. Ferdinand Mueller, and including type specimens of many of the *Eucalypti* and *Acaciae* described in his Papers, published in the Society's "Journal;" presented by Dr. Müller.

The valuable Collection of British Algæ, formed by the late Mrs. Griffith, and arranged according to Dr. Harvey's "Manual of British Algæ;" presented by the Subscribers to a fund for its purchase.

Read, the commencement of a Paper, entitled "Notes on British Botany;" by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings;" Supplement, vol. ii.)

November 18th, 1858.

Francis Boott, Esq., M.D., Vice-President, in the Chair.

Cyril C. Graham, Esq., and J. R. Kinahan, Esq., M.D., were elected Fellows; and Mr. Charles Barter an Associate.

The Vice-President in the Chair announced the formation by the Society of a British Herbarium; and Mr. Bentham (who, in conjunction with Dr. Alexander and Mr. Babington, and with the assistance of Mr. Oliver, had undertaken the arrangement of the Collection) stated that it was now completely arranged, and gave some explanation of the principles on which it had been formed.

Read, first, a continuation of Mr. Bentham's "Notes on British Botany."

Read, secondly, "Notes on some English Plants;" by John Hogg, Esq., F.R.S., F.L.S. &c.

December 2nd, 1858.

Thomas Bell, Esq., President, in the Chair.

Charles Ratcliff, Esq., and James Sidney Walker, Esq., were elected Fellows; and Dr. Frederick Welwitsch an Associate.

Read, first, a "Catalogue of the Hymenopterous Insects collected by Mr. A. B. Wallace at the Islands of Aru and Key;" by Frederick Smith, Esq. Communicated by William Wilson Saunders, Esq., V.P.L.S. (See "Zoological Proceedings," vol. iii. p. 132.)

Read, secondly, Notes "On the Linnean MS. of the Museum Ludovicæ Ulricæ Reginæ;" by Sylvanus Hanley, Esq., F.L.S. (See "Zoological Proceedings," vol. iv. p. 43.)

Read, thirdly, a "Note on the Morphology of the *Balsaminaceæ*;" by Prof. Henfrey, F.R.S., F.L.S. (See "Botanical Proceedings," vol. iii. p. 159.)

Read, fourthly, a "Notice of the Arborescent Ferns of New Zealand;" by T. S. Ralph, Esq., A.L.S. (See "Botanical Proceedings," vol. iii. p. 163.)

December 16th, 1858.

Thomas Bell, Esq., President, in the Chair.

Thomas Henry Huxley, Esq., F.R.S., was elected a Fellow.

Among the presents was the extensive Herbarium of the late Thomas Bell Salter, Esq., M.D., F.L.S.; presented by his brother, S. James A. Salter, Esq., F.L.S., for which the special thanks of the Society were directed to be given.

Read, first, a "Notice of two Insect-products from China;" by Daniel Hanbury, Esq., F.L.S. (See "Zoological Proceedings," vol. iii. p. 178.)

Read, secondly, a "Monograph of the East Indian Species of *Utricularia*;" by Daniel Oliver, Esq., F.L.S. (See "Botanical Proceedings," vol. iii. p. 170.)

Read, thirdly, "Observations on the Structure of the Stem in certain Species of *Caryophylleæ* and *Plumbagineæ*;" by Daniel Oliver, Esq., F.L.S. (See "Transactions," vol. xxii. p. 289.)

January 20th, 1859.

Thomas Bell, Esq., President, in the Chair.

Thomas Anderson, Esq., M.D.; Thomas Boycott, Esq.; the Hon. Walter Elliot; the Rev. William Houghton; Dr. Ferdinand Müller; H. T. Stainton, Esq.; and Major Richard Strachey, were elected Fellows.

Read, first, a "Notice of *Entozoa* found in various Animals dissected at the Zoological Society's Gardens;" by Thomas Spencer

Cobbold, Esq., M.D., F.L.S. (See "Transactions," vol. xxii. p. 863.)

Read, secondly, a Paper "On *Tbmopteris onisciformis*;" by W. B. Carpenter, Esq., M.D., F.R.S., F.L.S. (See "Transactions," vol. xxii. p. 853.)

Read, thirdly, "*Dennisonia, Barklya, and Laboucheria*; genera Floræ Australiæ nondum cognita;" by Dr. Ferdinand Müller, F.L.S. (See "Botanical Proceedings," vol. iii. p. 157.)

February 8rd, 1859.

Thomas Bell, Esq., President, in the Chair.

William Eatwell, Esq., M.D., was elected a Fellow.

Read, first, a Memoir "On *Henriquezia* of Spruce, a genus of *Bignoniaceæ*;" by George Bentham, Esq., V.P.L.S. (See "Transactions," vol. xxii. p. 295.)

Read, secondly, a continuation of Mr. Bentham's "Notes on British Botany."

February 17th, 1859.

Thomas Bell, Esq., President, in the Chair.

Howard Warburton Elphinstone, Esq.; Charles William Harrison, Esq.; and Dr. E. Percival Wright, were elected Fellows.

Read, first, a Paper "On the Dermal Armour of *Jacara* and *Caiman*, with Notes on the Specific and Generic Characters of recent *Crocodylia*;" by Thomas Henry Huxley, Esq., F.R.S., F.L.S. (See "Zoological Proceedings," vol. iv. p. 1.)

Read, secondly, a Paper "On the Anatomical Characters of Compound *Tunicata*;" by John Dennis Macdonald, Esq. Communicated by the Royal Society. (See "Transactions," vol. xxii. p. 878.)

Read, thirdly, "On the Anatomical Characters of an Australian

species of *Perophora*;" by J. D. Macdonald, Esq. Communicated by the Royal Society. (See "Transactions," vol. xxii. p. 377.)

Read, fourthly, a "Catalogue of the Heterocerous *Lepidoptera* collected at Singapore by M. A. R. Wallace, with Descriptions of New Species;" by Francis Walker, Esq., F.L.S. (See "Zoological Proceedings," vol. iii. p. 196.)

March 3rd, 1859.

Thomas Bell, Esq., President, in the Chair.

George Vernon Blunt, Esq., was elected a Fellow.

Among the presents was a Collection of Dried Specimens of British Algæ, formed by Dr. Cocks, of Plymouth; presented by the Subscribers for its purchase, to whom the special thanks of the Society were voted.

Read, first, a Letter from Mr. Charles Barter, A.L.S., to Sir William Jackson Hooker, F.L.S., on the Vegetation of the West Coast of Africa. (See "Botanical Proceedings," vol. iv. p. 17.)

Read, secondly, a Letter from M. Emile Bourgeau, addressed to Sir W. J. Hooker, on the Vegetation and Climate of the Saskatchewan. (See "Botanical Proceedings," vol. iv. p. 1.)

Read, thirdly, "Observations on the growth and times of appearance of some of the Marine Algæ;" by John Cocks, Esq., M.D. Communicated by Robert Hudson, Esq., F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv. p. . .)

Read, fourthly, a Note "On five new plants of Eastern Peru;" by Richard Spruce, Esq. Communicated by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. iii. p. 191.)

March 17th, 1859.

Thomas Bell, Esq., President, in the Chair.

The Rev. George Weare Braikenridge; H. B. Brady, Esq.; and Samuel Gurney, Esq., were elected Fellows.

Read, first, a Memoir "On Vegetable Affinities;" by T. C. Hilgard, M.D. Communicated by Berthold Seemann, Ph.D., F.L.S.

Read, secondly, a "Note on Monstrosities of *Daucus Carota*, L., and *Trifolium pratense*, L.;" by Maxwell T. Masters, Esq. Communicated by the Secretary.

Read, thirdly, "Descriptions of new species of *Musci* from New Zealand and other parts of the Southern Hemisphere;" by William Mitten, Esq., A.L.S. (See "Botanical Proceedings," vol. iv. p. 64.)

April 7th, 1859.

Thomas Bell, Esq., President, in the Chair.

Edward Sheppard, Esq., was elected a Fellow.

The Secretary read the following letter addressed to him by Dr. Boott, Treasurer and V.P.L.S., accompanying the donation of a Miniature of the elder Hedwig, for which the special thanks of the Society were ordered:—

"MY DEAR BENNETT,—I send the ring containing the little miniature of Hedwig for the Linnean Society. You will see the name on the back in the hand-writing of Sir James E. Smith; and on referring to the second volume of his 'Memoirs,' p. 98, you will find a letter from the younger Hedwig, which accompanied the gift of the ring to Sir James, and at p. 107 Sir James's acknowledgment of both. The ring was given to me by Lady Smith in 1857, and I feel that it cannot but be acceptable to the Society, as a memorial of one of the most distinguished of its Foreign Members.

"Yours affectionately,

"F. BOOTT."

"J. J. Bennett, Esq., F.R.S., Sec. Linn. Soc."

The special thanks of the Society were likewise directed to be given to Mr. Bennett for his Donation of an extensive series of botanical works selected from the library of the late Robert Brown, Esq., D.C.L., V.P.L.S.

Read, first, a Paper "On the Cranial Characters of a Rat new to the British Fauna;" by S. James A. Salter, Esq., M.B., F.L.S.

Read, secondly, "On the Moulting of the Common Lobster (*Homarus vulgaris*) and Shore-Crab (*Carcinus menas*);" by S. James A. Salter, Esq., M.B., F.L.S. (See "Zoological Proceedings," vol. iv. p. 30.)

Read, thirdly, a Note "On the Habits of the Aye-Aye (*Cheiromys madagascariensis*);" by Henry Sandwith, Esq., M.D., C.B., in a letter to Professor Owen, F.R.S., V.P.L.S. (See "Zoological Proceedings," vol. iv. p. 28.)

April 21st, 1859.

Thomas Bell, Esq., President, in the Chair.

John Forbes Watson, Esq., M.D., was elected a Fellow.

A Letter was read from Mr. A. G. Moore, F.L.S., mentioning the occurrence in considerable numbers of *Squilla Desmarestii* off Sea View and Bembridge, and of *Vespertilio murinus* about the cliffs at Freshwater, in the Isle of Wight.

A Letter was also read from Thomas Forster, Esq., M.B., F.L.S., giving some account of the phenomena of the present season on the French coast; and an Extract of a Letter from Albert HAMBROUGH, Esq., F.L.S., announcing the discovery, on the sea-shore at Ventnor, of a rather scarce shell, *Vertigo cylindrica*.

Read, first, "Remarks on *Gnetum*;" by the late William Griffith, Esq., M.D., F.L.S. Communicated, with a Prefatory Note, by Professor Henfrey, F.R.S., F.L.S. (See "Transactions," vol. xxii. p. 299.)

Read, secondly, a "Note on the species of *Oroton* described by Linnaeus, under the names of *Clutia Eluteria* and *Clutia Cascarilla*;" by John Joseph Bennett, Esq., F.R.S., Sec. L.S. (See "Botanical Proceedings," vol. iv. p. 26.)

May 5th, 1859.

Thomas Bell, Esq., President, in the Chair.

Henry Munroe, Esq., M.D., and Charles Prentis, Esq., were elected Fellows; and Professor J. F. Brandt, Professor A. H. R. Grisebach, Professor J. L. Lovén, and Mons. H. A. Weddell, were elected Foreign Members.

Read, first, "Further Observations on the New Organ in the Antennæ of Insects;" by John Braxted Hicks, Esq., M.D., F.L.S. (See "Transactions," vol. xxii. p. .)

Read, secondly, a "Synopsis of the Genera *Thea* and *Camellia*;" by Berthold Seemann, Esq., Ph.D., F.L.S. (See "Transactions," vol. xxii. p. 337.)

Read, thirdly, a "Synopsis of the Fructification of the Simple *Sphæræ* of the Hookerian Herbarium;" by Frederick Currey, Esq., F.R.S., F.L.S. (See "Transactions," vol. xxii. p. 313.)

Read, fourthly, a second Letter from M. Emile Bourgeau, addressed to Sir W. J. Hooker, F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv. p. 13.)

May 24th, 1859.

Anniversary Meeting.

Thomas Bell, Esq., President, in the Chair.

This day, the Anniversary of the birth of Linnæus, and the day appointed by the Charter for the Election of Council and Officers, the President opened the business of the Meeting with the following Address:—

GENTLEMEN,

THE year which has passed since I last had the pleasure of meeting you on our Anniversary, has not been unproductive in contributions of interest and value, in those sciences to which we are professedly more particularly addicted, as well as in every other walk of scientific research. It has not, indeed, been marked by any of those striking discoveries which at once revolutionize, so to speak, the department of science on which they bear; it is only at

remote intervals that we can reasonably expect any sudden and brilliant innovation which shall produce a marked and permanent impress on the character of any branch of knowledge, or confer a lasting and important service on mankind. A Bacon or a Newton, an Oersted or a Wheatstone, a Davy or a Daguerre, is an occasional phenomenon, whose existence and career seem to be especially appointed by Providence, for the purpose of effecting some great important change in the condition or pursuits of man.

The establishment of the inductive method (by which the whole face of philosophy, before chaotic, was reduced to order), the discovery of the law of gravitation, the invention of the electric telegraph, or the production of sun-pictures—these and similar results of genius, by which the advance of knowledge and the designs of Providence are carried forward by grand and unexpected impulses, are occurrences, the like of which we must not expect to have annually to record.

Nor are even the striking examples to which I have referred, influential as they are and original as may be the genius which finally applies them, usually isolated or sudden. The suggestions of previous experiment or discovery, the hints which are given from time to time by either fortuitous or anticipated phenomena, ordinarily afford the ground upon which the most important discoveries or improvements are made. The electric telegraph may be traced from the first intimation of the possibility of the transmission of the electric force to a distance, through successive occasional advances, to the happy hour when Oersted discovered the great truths of electro-magnetism, and Wheatstone applied the discovery to a purpose which is destined to affect, more than any other single practical application of science that was ever made, the condition, the destinies, and the welfare of mankind. In like manner the consecutive suggestions of Watt, of Davy, of Talbot, of Herschel, of Daguerre, of Niépce de St. Victor and others were required to bring to even its present state of advancement, the art of photography. The history of almost every scientific discovery of importance would afford similar illustrations, which will suggest themselves to your minds, and which it is unnecessary for me to enlarge upon.

Of the results of such successive developments as those to which I have referred, in those departments of science which are usually considered as of a more abstract character, and in those which are properly the subject of experimental processes, the late President of the Royal Society gave at their last Anniversary some very instructive examples in his lucid and interesting address, which

has doubtless been in the hands of most of the Fellows of this Society; and I hope that I shall not be considered as travelling much out of the record, if I recall at this time, when the Royal Society has so lately been deprived of his services, the great merits of one who would yield to no one of his predecessors in a zealous and unselfish devotion to the interests of science, in the employment of the prestige which his social and official position alike gave him in promoting its objects, and in the solid judgment, never within my experience surpassed, by which the affairs of the Royal Society were conducted by him, whether in Council or in private;—and in addition to these considerations, the Fellows of the Linnean Society would, with good reason, consider me as wanting in my duty to them, as well as to that excellent nobleman, if I were to omit a grateful allusion to the kind and friendly interest which he invariably manifested for the welfare of this Society, and the urbanity and consideration with which he ever received any suggestions for that mutual assistance and goodwill which he was always anxiously desirous to promote.

I cannot, however, close this digression without referring with grateful satisfaction to the choice which the Royal Society has made of a successor to Lord Wrottesley, in the person of one who devoted the leisure hours of a long and laborious professional career to the successful cultivation of a branch of science allied to those which are considered as especially the objects of this Society; whilst by a marvellous power of acquiring and retaining knowledge, and by that incessant employment of the intervals of professional labour in which, as our great moralist has well declared, consists the true economy of time, he has stored his acute and capacious mind with a fund of knowledge as rich as it is varied. In the close relation in which we now happily stand to the Royal Society, the appointment of its President is matter of no small moment to us in our corporate capacity, in addition to the interest we must feel as competitors in the arena of scientific labour; and I am quite sure that we shall continue to enjoy in the conduct of the present President the advantages of that combined kindness and wisdom which characterized his predecessor.

If the events of the past year have not, however, as I have stated, been so influential or emphatic as some which have marked the period of their occurrence as an epoch in scientific history, the more silent and finally not less productive current of discovery is ever going on, and its recent results in every field of research have been such as to prove that the yearning after knowledge was never

more earnest, nor the love of the truths of nature ever more ardent and sincere than at the present time. In evidence of this steady progress I will refer you to the meetings of our own Society, and the results of those meetings in the papers already published, or about to be published, in our 'Transactions' or the 'Journal of Proceedings.' I believe that I may safely compare them with those of any former period for their variety and value. The botanical element of our functions still predominates as it has done; and, from the nature and comparative extent of the two pursuits, it must continue to predominate. Such indeed has been the number of papers in this department, considered by the Council as worthy of publication, that it has been found necessary to issue, within the year, two supplemental parts of the 'Journal of Proceedings;' a step, which, although requiring much consideration on account of the expense, is fully justified by the importance of the contents of the volume.

But while we have thus advanced in the quantity of valuable matter presented to us in our botanical department, a glance at the communications belonging to the other branch of our labours will show that in zoological science we have not been retrograding either in their number or value. There is, however, yet room for a more zealous movement amongst the zoologists of our body; and the complaint which I ventured to express on a former occasion is not yet rendered unnecessary or untimely. Many papers on zoological subjects are still read at the meetings of collateral societies, which, as it appears to me, would legitimately belong to us, and would merit a situation in our own publications, where some of them at least would be more in place than where they now appear.

In recurring thus to the 'Transactions' of the past year, I abstain from particularizing any of the papers as especially interesting or valuable, as selection would be invidious where all are good, and every student will be able to judge for himself of their respective value and importance. Some of the most interesting of them—and this refers to papers which have been read at the meetings of other societies as well as of our own—are on subjects still under controversy, the discussion of which belongs to another arena than that of the brief address which it is my duty to offer to you; for I have always thought that this is not the fit occasion for the enunciation of individual opinion or judgment, but rather for a simple sketch of the general working of the Society and the progress of science in connexion with it.

The primary and ostensible office of the Linnean Society is, un-

doubtedly, the promotion and record of discoveries or improvements in the science of Natural History, both in its systematic and physiological phase, by means which the Charter has provided,—in its meetings, its publications, its library, and its collections; but, as the recognized centre and head of these sciences in this country, it has always appeared to me that the Society might exercise certain collateral functions (having for their object the encouragement of this branch of knowledge, and its spread amongst the people) which are not wholly alien from that primary object, and which may legitimately come within the scope of its original design. To one of these I called attention on a former occasion, when I suggested that a relation might with advantage be established between the Society and the numerous respectable local institutions now existing in almost every county in England, having for their object the cultivation of the natural history and antiquities of the neighbourhood. But besides this, may there not be another, equally if not more efficacious means of promoting this object, in the aid and patronage which the Society might, indirectly perhaps, but not ineffectually, afford to that educational movement which appears to have decidedly taken place in this direction? Whether or not it be practicable for us as a body to take any ostensible part in this important work is at least doubtful, but certainly it behoves every Fellow of the Society in his individual and personal capacity,—I might almost say in fulfilment of his initiatory obligation, entered into when he joined the Society,—not to omit any opportunity of furthering this desirable end. It is very cheering to the mind of every one who fully apprehends the unspeakable value of these studies in forming the mind and ameliorating the tempers and affections of our youthful population, by exciting and fostering a love of Truth, and training them in the knowledge and admiration of the works of God, to see that there is a daily increasing appreciation of their importance. Nothing can more evidently manifest this encouraging feature of the educational tendencies of the present day, than the great demand for popular works on natural history, whether of a more systematic or biographical character,—whether general or limited to one special department. This demand is liberally supplied by the issue of numerous works, which, if they are not all characterized by perfect accuracy of detail, or philosophical views of generalization, or sound principles of arrangement, are yet calculated to excite and, in great measure, to satisfy the growing appetite for this department of knowledge. Such works as I refer to may be enumerated

by scores,—the least valuable of which would have been hailed in my early days of boyish love for natural history, as the greatest boon that could have been offered. Nor let it be supposed that the results of such reading, elementary though it be, is of slight import. The consequence may be very important, and some future Cuvier or Owen may refer his earliest scientific tendencies to the perusal of some of these educational works: "*res parva, sed initium non parvæ.*"

There are few circumstances which have a more powerful tendency to promote the love of such pursuits than the ready access of the masses of the people to the most beautiful and interesting natural objects, and their exhibition in a form at once pleasing and instructive. In this respect, as well as in its more important phase as illustrative of the progress of botanical science and its application to practical purposes, there is no existing fact which claims greater attention or excites deeper interest than the noble gardens at Kew. The statistics of this great Government establishment are so important, and involve so many considerations which are of public moment, as well as such advantages to the scientific student, that a brief account of the progress recently made in its different departments, cannot fail to be interesting to the Fellows of the Linnean Society.

At a time when the public mind is fully awake to the great importance of affording to the people the means of rational and healthful enjoyment, and when the efforts of all who are earnest on the great subject of popular education are directed to the best means of instruction in those sciences which are at once economically useful and intellectually improving, the ready and free access to such sources of mental enjoyment and practical information as are here combined on a scale of unexampled magnificence, must be a subject of the deepest interest, and the success of the establishment a cause of hearty congratulation.

The vast number, the extreme beauty and the healthy and flourishing condition, no less than the intrinsic value of the living vegetation within the precincts of the garden, especially in those parts of it to which the steps of the public are ordinarily directed—the admirable arrangement of the grounds and the charming walks—combined with the facility with which access is attained to such attractions, render it no matter of surprise that even at such a distance from the metropolis, the gardens are frequented by visitors whose annual numbers are no longer to be counted by

hundreds or by thousands, but by hundreds of thousands. The number of persons who visited the gardens during the last year amounted to no less than 405,376; which, contrasted with the comparatively small number of 9174 in the year 1841—since which time, with one or two exceptions, every succeeding year has surpassed that which preceded it—shows an increase both in the attractions of the place, and in the public appreciation of its beauties and advantages, which are highly gratifying and suggestive. A perusal of the annual reports from Sir William Hooker to the Government, will show the most satisfactory and regular progress in every department and phase of the establishment.

The Arboretum, now the finest in Europe, contains all the most important species of hardy trees, in the most healthy and flourishing condition, which may be examined and studied by every one who is interested in Arboriculture or in the Botany of Trees. The Queen's garden has received a liberal addition of 14 acres to its extent; a large lake of $4\frac{1}{2}$ acres is in progress of construction; and the whole of this portion of the gardens is advancing rapidly to as nearly a perfect state as an energetic application of art and science can render it.

Every one is too well acquainted with the magnificent Palm-house, and the other receptacles for plants requiring heat and protection, to render any particular description necessary; it is sufficient to say that here also continual improvements are going on. But gratifying as are the advances which are taking place in this more obvious and popular province, the scientific botanist is perhaps more interested in the unrivalled herbarium, which, with its accumulated treasures, has for some years past constituted a focus of attraction, not to the botanist of this country only, but to the students of the science from all parts of Europe and from America. The list of those who have considered it worth their while to take up their temporary abode at Kew for this especial purpose, includes many of the most distinguished names amongst the botanists of various parts of Germany, of Denmark, of Sweden, of Russia, of France, and of different states of the American Union, as well as the most eminent cultivators of the science in the United Kingdom; and the standard works which have been either wholly or in part completed from this source are too numerous to be now particularized. The rescue of the available portion of the accumulated mass of herbaria which had lain for years in the cellars of the India House, and were fast going to destruction, which has been effected in consequence of remonstrances from Kew, and their de-

posit amongst the treasures of that great emporium, is another feature in the recent arrangements made under the superintendence, and emanating from the zeal of Sir William Hooker, which cannot fail to be of the greatest advantage to the Indian botanist.

But if there be one department in the Kew establishment which is more generally interesting than another, it is, in my opinion, the Museum of Economic Botany. This beautiful repository of the various applications of vegetable matters to the uses of mankind, is, I believe, unrivalled in any other country. Its interest is not confined to the man of science—it belongs to the physician, the chemist, the manufacturer, the artisan in every grade and of every calling, to the artist and the scholar, the soldier and the man of law. The energy and intelligence with which this curious and beautiful collection has been built up and arranged reflects the highest honour upon Sir William and Dr. Hooker, as well as upon those who, under their able direction, have worthily carried out their plans and arrangements; and under such management it cannot but continue to prosper.

It is not only at Kew, however, that the means of study have been augmented during the past year. The lamented death of Mr. Brown has occasioned the deposit in the National Emporium of his unrivalled collection of fossil woods, many of which are unique, and the whole of them of the highest interest and value. They were bequeathed to the British Museum, on the condition that they should be considered as part of the Botanical collection in that place. A large number of drawings of Australian plants and animals, from the pencil of Ferdinand Bauer, is another boon to that department, by the bequest of the same distinguished benefactor. These are drawn from the life; and it is unnecessary to say, to those who are acquainted with the productions of this matchless artist, that nothing of the kind exists more accurate and beautiful than are the whole of this fine collection.

Whilst speaking of the British Museum, and referring also to the late Keeper of the Botanical department, I am reminded of a fact, which I should not be acting in accordance either with your feelings or my own if I were to pass over without an expression of sincere gratification,—I allude to the appointment of one to whom we, as a Society, owe a debt which we can never hope in any degree to liquidate, our excellent Secretary, as the successor of Robert Brown. That appointment is as deserved on his part as it is an act of justice on the part of the Trustees; and I am sure that you will all unite with me in affectionate and earnest

wishes that Mr. Bennett may long continue to exercise the functions of an office which every one felt to be so justly his due.

I will now return to the more direct affairs of the Linnean Society itself. Here, as is usual, we have to approach the subject with mingled feelings of congratulation and regret. Whilst we have cause for great satisfaction in the progress which has been made in science under the auspices of the Society, the increase in the number of our members, the favourable condition of our finances, enabling us to provide for not only the continuance, but the increase of our publications, whilst we see fresh volunteers in the peaceful array of Science enlisting under our banners, there is another and a gloomy phase to which our attention is painfully enforced. The loss which we sustain from time to time by death, as it is always a subject of deep regret, and one on which it is painful to dwell, presents on the present occasion a more than usually sad aspect. Our obituary includes two of the most distinguished men who have ever adorned our Society—Robert Brown on our home list, and Alexander von Humboldt on that of our foreign members, are names which it is an honour to this Society and to any other to which they belonged, to have had enrolled amongst its members. The first scientific societies and academies in Europe numbered them amongst their most honoured associates; and their mutual esteem and their high estimation of each other's talents and labours reflected equal honour upon both. To the scientific world the loss is indeed great; and in our own sphere, although, with the rest of the world, we lament the extinction of such a splendid light as Humboldt, yet as a few only of our number enjoyed the happiness of his intimate friendship, our feelings of personal and affectionate sorrow are more awakened by the removal of him with whom we were in the constant habit of familiar and delightful intercourse.

But to both these great men is due the tribute of our sincere and profound regret. On the one hand, the Prince of Botanists, the man of universal information, of a rare and solid wisdom, the firm and constant friend, the kind and genial companion, the honest and upright man;—on the other, the profound philosopher, the universal genius, comprehending within the vast grasp of his mind such an extent and variety of knowledge, such an instinctive perception of the truths of nature, as have rarely, if ever, fallen to the lot of any man before him,—such are the two men whom, as during this life they were the objects of our veneration and love, we now, with a corresponding earnestness, deplore.

Any attempt on my part to do justice to this subject would be wholly futile, in anticipation of the memorial which you will presently hear from our esteemed Secretary, whose facile pen displays even more than its wonted eloquence when employed on the character of those whom he has loved and respected; but there are one or two circumstances, to a knowledge of which I have had incidental access, either connected with the career of Mr. Brown, or in which I have been personally concerned, which I will beg your permission to mention.

When a great man has departed from amongst us, and we are enabled to take, as it were, a bird's-eye view of his whole career, and contemplate all that he has achieved in the sphere of action, whatever that may be, in which he had distinguished himself,—when, especially, there has been some one line of discovery in which he has stood out from the ranks of his fellows, and with which his name has become identified,—it is interesting to look back into the distance and discern the one event, in itself probably trivial, which formed the starting-point of his journey, and had given a colour and a character to the subsequent history of his life and fame.

A simple letter which now lies before me constituted such a turning-point in the life and prospects of him whom we all deplore, and who gave a tone and impress to the science which he pursued with such untiring zeal, with such bright and clear intelligence, and with such enduring results. In a letter from Correa da Serra, who was at that time a frequent visitor to the library of Sir Joseph Banks, addressed to that distinguished patron of science, the future *Princeps Botanicorum* is recommended to conduct the Botanical investigations belonging to the proposed voyage of discovery to New South Wales, then about to be undertaken under the command of Flinders, and which was destined to lay the foundation of a future fame coextensive with the regions in which his transcendent labours could be appreciated. This remarkable letter forms an item in the important mass of materials now consigned to my temporary keeping, which I trust may hereafter form the basis of a life of the distinguished President of the Royal Society, to whom I have just referred. It will be readily imagined that, in the load of correspondence of which the greater part of these documents consists, some records might be found which would illustrate the intimate relation in which these two celebrated men stood to each other, and the influence which the talents and judgment and knowledge of Robert Brown must have exercised upon his respected patron and friend. An indirect indication of

this influence is afforded by some letters from Sir Joseph Banks, with reference to the unhappy voyage of Tuckey to the Congo, which, as it refers to an incident in my own life, and to my first introduction to my late revered friend, I trust that I shall be excused for relating. Many of you are aware that there was offered to me in the year 1815 the appointment of Naturalist to that ill-fated expedition. I sought an interview with Sir Joseph Banks, to whom I was referred for information, and with whom rested that appointment. Sir Joseph Banks being absent, I had a long conversation with Mr. Brown, then his librarian; and he, with his accustomed kindness, laid before me the difficulties, the dangers, and the improbabilities of success, which presented at that time such formidable discouragements to those who were to form the expedition, and which were in great measure the cause of my declining the appointment. Now, on looking over the voluminous correspondence which I have mentioned, it struck me as highly probable that I should find some allusion to the circumstances of the expedition; and I find, in several letters from Sir Joseph Banks to the Government, representations which coincide entirely, as far as my memory serves me, with many of the dissuasive reasons which Mr. Brown had urged upon me.

I will not trouble you longer upon these painful subjects, which will presently be presented to you more at large. Happily there are other and more cheerful matters to which it is my duty to recur; there is the white as well as the black side of the shield.

Of the presents which have been made to our library and collections, besides an unusual number of valuable books of the ordinary description, there are some which demand especial notice. A large collection of desiderata has been presented by Mr. Bennett, of books which had belonged to the late Mr. Brown, to the extent of about 800 items, many of them of particular value to us; and we have just received from our respected Fellow, Mr. Cuming, the gift of all the works, not already in our possession, from his large collection of conchological publications, perhaps altogether the most complete in the world—those presented to us amounting to about 200 volumes. These munificent donations will fill up many hiatus in our library, and render it very complete in those departments to which the works particularly belong.

A very interesting addition has been recently made to our collection of Linnean MSS. by the presentation of many original letters of Linnæus formerly belonging to my old friend Dr. Maton,

for many years a respected Vice-President of the Society; to whose niece, Miss Wray of Ryde, we are indebted for this most acceptable present.

In the Botanical collections we have received from Mr. James Salter the whole of the Herbarium of British Plants of our lamented Fellow, Dr. Bell Salter of Ryde; which, in addition to its being perhaps one of the most complete British Herbaria ever formed, possesses a peculiar value from its containing the typical specimens of his species in the genera *Rosa*, *Rubus*, *Saxifraga* and others, to which, as is well known, he had paid especial attention. A complete set of specimens from the great Javan Herbarium of our venerable and distinguished Fellow, Dr. Horsfield, has also recently been presented to us, by which our already extensive and highly valuable Indian collections will be greatly increased in interest and importance. These have already passed through the hands of our Foreign Member, Professor Miquel of Amsterdam, now engaged on a Flora of Java, by whom they have been named.

Before I conclude, it may perhaps be expected that I should allude to a subject which has excited a good deal of anxiety, and, at one time, some alarm in the minds of the Fellows of the Societies which meet in this mansion—I mean the proposed erection of buildings for various objects connected with Science and Art on the area of the ground belonging to this place. It was of course to be expected, and greatly to be desired, that so advantageous a site should not be left unoccupied whilst there were so many Societies and Institutions connected with intellectual pursuits which were wholly unprovided with an independent local habitation, or were but inconveniently and uncertainly placed. Some have to obtain accommodation for themselves and at their own expense; and even those which enjoy the privilege of meeting in apartments provided by the Government, are wholly severed from those kindred institutions, a near approximation of which would be so mutually beneficial. It will be recollected that the movement which some years since originated in the anxiety of a number of Fellows of the Royal and other Societies to obtain a juxtaposition of the Chartered Societies which represented departments of Science, terminated in our obtaining from the Government the present advantageous position for the three bodies now occupying Burlington House. Still the plan was but imperfect, and we have always anticipated the probable appropriation of the whole site to the great object of bringing into one

focus all the principal institutions connected with Literature, Science, and Art, with a grandeur and completeness worthy of the nation.

Still it was matter of serious concern in what manner it should be carried out. Whether the whole space should be appropriated to this "holy alliance," or whether they should be locally associated with offices of mere Government business,—whether the nature and position of the buildings should be so arranged as to allow the present noble erection to remain, and thus its present occupants to retain their place within it undisturbed, or whether it would be necessary, in carrying out the final plans of the architect, to level with the ground a building so handsome, so substantial, and so well adapted to its present purpose. Supposing the latter alternative to be decided upon, there sprung up the important question whether the new buildings were to be completed and ready for our permanent occupation before we should have to quit the tenure of our present abode. Although it is not in my power to enter into any detail on the plan and arrangements of the architects appointed by the Government, I have great satisfaction in being able to state confidently that there is every disposition on their part to meet our wishes in the most effective and liberal manner. There will be no disturbance of the Societies in these present apartments until the new ones are fit for their reception. Our own accommodation will, there is every reason to anticipate, be even more complete than at present; and I trust that our proximity to the Royal Society, from which both have derived so much comfort, and I trust mutual accommodation and advantage, will still be provided for.

Gentlemen, I will not detain you longer. With an increasing revenue, with enlarged means of carrying out our mission, with a list of Fellows more numerous, and I trust and believe more energetic in the cause of Science than ever, I feel that I have a right to conclude this address with the feeling of deep gratitude for the past, of sincere congratulation on our present condition, and of the brightest hope for our future prospects.

OBITUARY NOTICES.

The Secretary then read the following notices of deceased *Fellows, Foreign Members, and Associates* :—

William John Broderip, Esq., was born in Bristol, November 21st, 1789. His father was an eminent medical practitioner in

that sea-port, and his collections of shells and corals afforded the child some of his earliest and favourite playthings. A schoolboy at the Rev. S. Sayer's academy, one of the amusements of the vacations was the arrangement and the study of the species of the paternal museum; so that when young Broderip proceeded to Oxford, to be matriculated at Oriel College, he took with him, in addition to that basis of sound classical knowledge, in forming which Sayer had so high a reputation, a larger amount of zoological knowledge than perhaps any member of the learned University at that time possessed.

Dr. Buckland, who then (1809) was Fellow and Tutor of Corpus Christi College, wrote of Broderip, in a letter now in his son's possession, "In my earlier years of residence at Oxford I took my first lesson in field geology in a walk to Shotover Hill with Mr. William John Broderip, of Oriel, whose early knowledge of conchology enabled him to speak scientifically on the fossil shells in the Oxford oolite formation, and of the fossil shells and sponges of the greensand of the Vale of Pusey near Devizes, as to which he had been instructed by the Rector of Pusey, Mr. Townsend, the friend and fellow-labourer of Mr. Wm. Smith, the father of English geology. The fruits of my first walk with Mr. Broderip formed the nucleus of my collection for my own cabinet."

The value of an early cultivation of Natural History has rarely been exemplified in a more striking degree than in the consequences of this collision of congenial minds, and in the splendid results which may be attributed to the stimulus which the special knowledge of the undergraduate gave to the Fellow of Corpus, who subsequently became the famous Professor of Geology in the University of Oxford.

The son and biographer of Dr. Buckland has remarked that "in after years Mr. Broderip was associated with Dr. Buckland on the closest terms of family friendship and intimacy; and he rendered him the greatest assistance in his scientific labours, more especially in the revisal of the earlier editions of his '*Bridgewater Treatise*.'"

Mr. Broderip, besides his proficiency in the classical and dialectic studies of Oxford, of which the influence is manifested in his subsequent writings, attended the anatomical lectures of Sir Christopher Pegge, and the chemical and mineralogical lectures of Dr. Kidd.

After taking the degree of B.A. he proceeded to London, entered at the Inner Temple, and commenced the study of the law in the

chambers of Godfrey Sykes, having as fellow-students, Patterson and Coleridge, who were subsequently raised to the Bench. In 1817 Mr. Broderip was called to the Bar, and selected the Western Circuit. He soon became favourably known as a diligent prosecutor of the dry and difficult studies of his profession. He published an edition of 'Callis on Sewers,' which has become a law classic; and, in conjunction with Mr. Bingham, the present metropolitan magistrate, he brought out three volumes of "Law Reports." Lord Sidmouth, in 1822, appointed Mr. Broderip magistrate at the Thames Police Office.

The arduous duties of police magistrate were performed by Mr. Broderip at that office, and subsequently at the Westminster Court, during thirty-four years, with a combination of sound legal knowledge, firmness, good sense, kindly consideration, and compassionate mercy in every admissible case, which established his reputation as one of the best magistrates of which this vast metropolis has had the advantage, and which gained for him the confidence and esteem of each successive Minister for the Home Department.

The first seat of his judicial labours was in the midst of that mighty fleet which brings to the port of London the treasures and rarities of the world. Mr. Broderip's early fondness for Natural History was here revived, and he availed himself of his environment to begin the formation of those collections of natural objects which had been the source of the cherished pleasures of his childhood.

The conchological cabinet of Mr. Broderip soon became classical; and there were few among the foreign Professors resorting to London who did not avail themselves of Broderip's urbanity and liberality, to visit and inspect the treasures which were accumulated in his chambers in Gray's Inn. This collection was ultimately purchased by the British Museum.

Mr. Broderip was elected Fellow of the Linnean Society in 1824, of the Geological Society in 1825, and of the Royal Society in 1828. He cooperated zealously with Sir Stamford Raffles, Sir Humphry Davy, Joseph Sabine, and Vigors in the formation of the Zoological Society, of which he was one of the original Fellows and Members of Council. He accepted the office of Secretary of the Geological Society, and performed the arduous duties of that office, conjointly with Murchison, to the year 1830. In a note to the writer, Sir Roderick testifies to Mr. Broderip's labours of that period: "My coadjutor preserved the *lucidus ordo* of our

meetings, made our 'Abstracts,' and was, in truth, the Naturalist of the Society."

To the 'Transactions of the Geological Society' (2nd series, vol. v. p. 171), Mr. Broderip contributed a Paper "On some Fossil Crustacea and Radiata found at Lyme Regis in Dorsetshire." His description of "The Jaw of a Fossil Mammiferous Animal found in the Stonesfield Slate," is published in the third volume of the 'Zoological Journal.' To the same periodical Mr. Broderip communicated "Observations upon the *Volvox globator*," "On the Manners of a live Toucan exhibited in this country," "On the Utility of preserving Facts relative to the Habits of Animals, with additions to two Memoirs in 'White's Natural History of Selborne,'" "On the mode in which the Boa Constrictor takes its Prey," "On the Habits and Structure of *Paguri* and other Crustacea," a "Notice on the *Mus messorius*," together with several valuable conchological articles. The chief bulk of Mr. Broderip's original writings on Malacology was consigned to the 'Proceedings' and 'Transactions' of the Zoological Society. I may refer to the Indexes of those collections and publications, and to the 'Bibliographia Zoologiæ et Geologiæ,' published by the Ray Society, for the titles of these numerous and valuable memoirs.

Few naturalists have more closely observed—none perhaps have more graphically and pleasingly described—the habits of animals. Mr. Broderip's "Account of the Manners of a tame Beaver," one of the pets that tenanted his chambers, published in the work entitled 'The Gardens and Menagerie of the Zoological Society' (vol. i. p. 167), affords a favourable example of his tact as an observer and power as a writer. Had circumstances permitted, he would have been a Field Naturalist second only to Gilbert White. When his friend Professor Owen became, through Royal favour, the tenant of one of the lodges in Richmond Park, Broderip would spend there much time in close observation of zoological phenomena afforded by the garden and the wooded vicinity of Sheen Gate. A note announcing the commencement of nidification in the adjacent rookery, or the arrival of a migratory song-bird, would immediately bring the retired Police Magistrate to Richmond Park. Many references to facts so observed are made in those delightful combinations of profound and quaint learning with direct and close observation of nature which were contributed by Broderip to the 'New Monthly Magazine' and to 'Frazer's Magazine,' and which he afterwards collected and reprinted in the volumes entitled 'Zoological Recreations' (8vo,

1847), and 'Leaves from the Note-book of a Naturalist' (8vo, 1851).

Mr. Broderip was ever ready to aid a brother Naturalist. His collections, his rare zoological library, his pure classical taste and varied accomplishments, made the assistance he was able to give most valuable. We find it freely acknowledged in the early editions of Sir C. Lyell's 'Principles of Geology,' in the 'British Fishes' of Yarrell, in the 'Silurian System' of Murchison, and the 'Bridgewater Treatise' of Buckland. Broderip communicated a most valuable "Table of the Situations and Depths at which recent Genera of Marine and Estuary Shells have been observed," to the Appendix of De la Beche's 'Researches in Theoretical Geology,' and, in conjunction with Captain King, "Descriptions of the Cirripedia, Conchifera, and Mollusca collected during the Voyage of H.M.S. Adventure and Beagle, 1826-30" (Zoological Journal).

To the 'Quarterly Review' Mr. Broderip contributed articles on the Zoological Gardens, on the Vine, on the Cetacea and Whale-fisheries, on the Writings of Captain Basil Hall, on the Bridgewater Treatise of Dr. Buckland, &c. But the main bulk of this indefatigable student's zoological writings are contained in the 'Penny Cyclopædia,' viz. from Ast to the end, including the whole of the articles relating to "Mammals," "Birds," "Reptiles," "Crustacea," "Mollusca," "Conchifera," "Cirrigrada," "Pulmograda," &c., "Buffon," "Brisson," &c., and "Zoology."

At the latter period of his career Mr. Broderip was elected "Bencher" and "Treasurer" of Gray's Inn, and to him was confided the especial charge of the library of that ancient and honourable Society.

An attack of deafness, which resisted all the remedies applied, led Mr. Broderip to resign his office as Magistrate at the Westminster Police Court in 1856. His strict conscientiousness being equalled by a most delicate consideration for the feelings of others, he withdrew from much of that society of which the peculiar charms of his conversation and extensive and varied knowledge had made him an ornament and cherished member. His visits were now restricted to a very few of his oldest and most confidential friends, and he pursued his literary occupation with redoubled assiduity. His last publication, "On the Shark," appeared in the March Number of 'Frazer's Magazine.' It was the "first part" of an article on that subject, and bears all the marks of a mind in full intellectual vigour. On Saturday the 26th of

February, 1859, Mr. Broderip dined alone, at his chambers, returned to his favourite occupation in the evening, and retired to rest, leaving some sheets of his neat and fair MS. on his writing-table. He became unwell in the night, but did not consider himself so ill as to require medical aid; when it was obtained in the course of the following day, the symptoms of a fatal serous apoplexy had supervened, and he expired on the night of the 27th of February, aged 70.

Sir Arthur Brooke de Capell Brooke, Bart., M.A., was born in Bolton Street, May Fair, in the year 1791, and was educated at Magdalen College, Oxford, where he took his degree of Bachelor of Arts in 1810. In the same year he entered the army, and took the rank of Major in 1846. In 1823 he became a Fellow of the Linnean and of the Royal Societies, and subsequently also of the Geological. He died on the 6th of last December, at his seat, Oakley Hall, near Kettering, Northamptonshire, in the 68th year of his age.

In offering a brief sketch of the career of the greatest Botanist of the age, who for half a century formed the glory and ornament of our Society, our attention is chiefly arrested by his intense devotion to his favourite study, and by the calm, reflecting, and philosophical spirit which he brought to bear upon its pursuit, the combination of which qualities were alone sufficient to raise him, by his own unassisted efforts, to the highest position in the world of Science. *Robert Brown, Esq., D.C.L.*, was the second and only surviving son of the Rev. James Brown, A.M., Episcopalian Minister of Montrose, by Helen, daughter of the Rev. Robert Taylor, and was born in that town on the 21st of December, 1773. Several generations of his maternal ancestors were, like his father, ministers of the Scottish Episcopalian Church, and from them he appears to have inherited a strong attachment to logical and metaphysical studies, the effects of which are so strikingly manifested in the philosophical character of his botanical investigations. At an early age he was sent to the Grammar-school of his native town, where among his contemporaries was a boy of kindred talents, the late Mr. James Mill, with whom he maintained through life an uninterrupted intimacy. In 1787 he was entered at Marischal College, Aberdeen, where he immediately obtained a Ramsay bursary in Philosophy; and about two years afterwards, on his father quitting Montrose to reside in Edinburgh, he was removed to the University of that city, in which he continued his studies for several years, but without taking a degree, although

destined for the medical profession. At this early period the strong inclination of his mind to the study of Botany gained for him the favourable notice of the amiable Professor of Natural History, Dr. Walker; and he was induced, in the year 1791 (being then in the eighteenth year of his age), to lay before the Natural History Society, of which he was a member, his earliest Paper, containing an enumeration of such plants as had been discovered in North Britain subsequent to the publication of Lightfoot's 'Flora Scotica,' with critical notes and observations. Although this Paper, like most of those read before the Society, was not intended for publication, it led to the communication of his specimens and observations to Dr. Withering, who was then engaged in the preparation of the second edition of his 'Arrangement of British Plants,' and laid the foundation of a warm and intimate friendship between them. In 1795, soon after the embodiment of the Fifeshire Regiment of Fencible Infantry, he obtained in it the double commission of Ensign and Assistant-Surgeon, and proceeded with it to the North of Ireland, in various parts of which he was stationed until the summer of 1798, when he was detached to England on recruiting service. Fortunately for himself and for science, this service enabled him to pass several months, during this and the succeeding year, in London, where he availed himself to the utmost of the library and collections of Sir Joseph Banks, from whom his already established botanical reputation obtained for him a cordial reception. In 1799 he returned to his regimental duties in Ireland, from which he was finally recalled, in December of the following year, by a letter from Sir Joseph Banks, proposing for his acceptance the post of Naturalist in the Expedition for surveying the coasts of New Holland, then fitting out under the command of Captain Flinders. Within two days of the receipt of this letter, which placed within his reach the so-much coveted opportunity of devoting himself entirely to his favourite pursuit, he quitted the regiment and the military service; and in the summer of 1801 he embarked at Portsmouth, full of ardour and confident of success. His absence from England lasted more than four years, during which the southern, eastern, and northern coasts of New Holland, and the southern part of Van Diemen's Land, were thoroughly explored. In the month of October 1805 he arrived in Liverpool with a collection of dried plants amounting to nearly 4000 species, a large proportion of which were not only new to science, but exhibited new and extraordinary combinations of character and habit.

Immediately on his arrival in England, he was appointed Librarian of the Linnean Society, of which he had been elected an Associate in 1798. During his voyage he had been indefatigable in describing with the minutest accuracy the whole of the materials which he had collected, and in the accumulation of a vast store of facts and observations in relation to their structure and affinities, as well as to all the most important points in the anatomy and physiology of plants in general. The new views which were thus opened to him on a multitude of botanical subjects, he was enabled, by his position at the Linnean Society, and by the free and unrestricted access which was liberally accorded to him to the treasures of the Banksian Library and Herbarium, to enlarge and to perfect, and to lay them before the world in a series of masterly publications, which at once stamped upon him the character of the greatest and most philosophical botanist that England had ever produced. In 1810 appeared the first volume of his '*Prodromus Floræ Novæ Hollandiæ et Insulæ Van Diemen,*' which was received by all the more profound botanists of this country and of the continent as the work of a mind thoroughly imbued with the principles of the Natural System, and giving to that system, which had hitherto found little favour out of France, a wider and a firmer basis. This important work, together with his *Memoirs on Proteaceæ* and *Asclepiadææ*, which immediately followed, and his '*General Remarks, Geographical and Systematical, on the Botany of Terra Australis,*' appended to the '*Narrative of Captain Flinders's Voyage,*' published in 1814, by displaying in the most instructive form the superior advantages of the Natural System, whether in the monographic description of separate families, or in the comparison of the families with each other and with the entire mass of vegetation, gave new life to that system, and speedily led to its universal adoption. A series of *Memoirs* followed, chiefly in the *Transactions of the Linnean Society*, or in the appendices to various books of travel and survey, which gave fuller and more complete development to his views on almost every department of botanical science, and induced the illustrious Humboldt not only to confer upon him the title of "*Botanicorum facile Princeps,*" but also to salute him with the more comprehensive and expressive designation conveyed in the dedication of the '*Synopsis Plantarum Orbis Novi,*' "*Roberto Brownio, Britanniarum Gloriæ atque Ornamento, totam Botanices Scientiam ingenio mirifico complectenti.*" At the close of the year 1810, on the death of his old and intimate friend, the laborious, accurate and learned Dry-

ander, he succeeded to the office of Librarian to Sir Joseph Banks, who (on his death in 1820) bequeathed to him for life the use and enjoyment of his library and collections. These were subsequently, in 1827, with Mr. Brown's assent, and in conformity with the provisions of Sir Joseph's will, transferred to the British Museum; and from this latter date to his death, a period of upwards of thirty years, he continued to fill the office of Keeper of the Botanical Collections in the National Establishment. Soon after the death of Sir Joseph Banks he had resigned the Librarianship of the Linnean Society, of which he then became a Fellow; and having been for many years one of its Vice-Presidents, was at last prevailed upon, in 1849, to allow himself to be elected President. This office he retained till 1853. He became a Fellow of the Royal Society in 1811, and was several times elected into the Council. In 1839 he received its highest honour in the Copley Medal, presented to him "for his discoveries during a series of years on the subject of vegetable impregnation." In the meantime honours and titles had flowed in upon him from all quarters; and nearly every scientific Society both at home and abroad felt itself honoured by enrolling his name in the list of its Members. In 1832, the University of Oxford conferred upon him, in conjunction with Dalton, Faraday, and Brewster, the honorary degree of D.C.L. In the succeeding year he was elected one of the eight Foreign Associates of the Academy of Sciences of the Institute of France, his name being selected from a list including those of nine other *savans* of world-wide reputation, nearly every one of whom has since been elected to the same distinguished honour. During the administration of Sir Robert Peel, he received, in recognition of his great eminence in botanical science, a pension on the Civil List of £200 per annum. The King of Prussia subsequently decorated him with the cross of the highest Prussian Civil Order, "Pour le Mérite."

Among the more important of his Memoirs above referred to, may be mentioned his Papers on *Compositæ*, on *Rafflesia*, and on the Fecundation of *Orchideæ* and *Asclepiadææ*, in the Linnean Transactions; the botanical appendices to the Voyages or Travels of Tuckey, Parry, Franklin, Abel, King, and Denham; his Papers on Active Molecules, and on the plurality of Embryos in *Coniferæ*, and his contributions to Wallich's 'Plantæ Asiaticæ,' and to Horsfield's 'Plantæ Javanicæ.' Of his later publications, the most remarkable are his "Botanical Appendix to Captain Sturt's Expedition into Central Australia," published in 1849; and his Me-

moir "On Triplosporite, an undescribed Fossil Fruit," published in the Linnean Transactions in 1851. The pervading and distinguishing character of all these writings is to be found in the combination of the minutest accuracy of detail with the most comprehensive generalization. No theory is propounded which does not rest for its foundation on the most circumspect investigation of all attainable facts. In perusing them, we are first struck with the evident completeness of the investigation, and next with the wonderful sagacity with which the ascertained facts are brought to bear upon the question at issue. And these distinguishing qualities are equally obvious throughout the wide range of objects treated of, whether in the anatomy, the physiology, the classification, the description, the distribution; or the affinities of plants, and in the examination both of recent and fossil structures. Among the most important anatomical and physiological subjects of which they treat, particular mention is due to the discovery of the nucleus of the vegetable cell, and of the circumscribed circulation on the walls of particular cells; the development of the stamina, together with the mode of fecundation, in *Asclepiadeæ* and *Orchideæ*; the development of the pollen and of the ovulum in Phænogamous plants, with the peculiarities of the latter in *Coniferae* and *Cycadeæ*, and the bearing of these facts upon the general subject of impregnation; the origin and development of the spores of Mosses; and the discovery of the peculiar motions which take place in the "active molecules" of matter when seen suspended in a fluid under the microscope. Of structural investigations, the most important are those which establish the relation of a flower to the axis from which it is derived, and of the parts of a flower to each other, as regards both position and number; the analogy between stamina and pistilla; the neuration of the corolla of *Compositæ*, their æstivation and inflorescence; and the structure of the stems of *Cycadeæ*, both recent and fossil. To the study of fossil botany Mr. Brown was always strongly attached, and with a view to its prosecution he formed an extensive and valuable collection of fossil woods, which he has bequeathed under certain conditions to the British Museum. His collections in other departments were also considerable, and his library very extensive.

In private life Mr. Brown's character was thoroughly estimable. Shrinking, with instinctive modesty, from all public employments, whether professional or otherwise, which appeared to involve anything like display, he was sometimes thought, by those who knew him little, to be cold, distant, and reserved; while those who were

admitted to the privilege of his intimacy bear unanimous testimony to his unvarying kindness of heart, the genial warmth of his feelings, and the pure benevolence of his disposition. To a mind stored with anecdote he united a strong sense of humour, and a happy facility in its expression, which rendered him a most delightful companion. And when to these qualities we add his perfect simple-mindedness, his unswerving devotion to truth, and that singular uprightness of judgment, which rendered him on all difficult occasions a most invaluable counsellor, we shall easily perceive how it was that he became so warmly endeared to the hearts of his friends. From the death of Sir Joseph Banks, who bequeathed to him his house in Soho Square, he continued to occupy that portion of it which opened upon Dean Street; and it was in the library of that illustrious man, the scene of his labours for sixty years, surrounded by his books and by his collections, that he breathed his last, on the 10th of June in the present year, and in the eighty-fifth year of his age.

John Cator, Esq., of Beckenham Place, in the county of Kent, is referred to by Mr. Lambert as connected with Natural History by his uncle's marriage with the daughter of Peter Collinson, and the consequent possession of those MS. Notes on Botanical subjects, by Collinson, which Mr. Lambert made the foundation of a Paper in the tenth volume of our 'Transactions,' and which the late Mr. Dillwyn subsequently printed separately under the title of 'Hortus Collinsonianus' 8vo: Swansea, 1843. Mr. Cator became a Fellow of the Linnean Society in 1811, and died at his house at Beckenham on the 20th of August, 1858, at the age of 76.

Richard Chambers, Esq., was born in London, in 1784. He was educated for the profession of a schoolmaster, and for many years had one of the largest private schools in the metropolis. Early in life he evinced a fondness for the study of natural history. He was elected a Fellow of the Linnean Society in 1822, and continued so to the close of his life, making occasional communications to the Society, besides being the author of 'An Introduction to the Study of Botany,' Lond. 16mo, 1847, and of many scattered Papers on kindred subjects in different periodicals. He was also one of the first members of the Zoological Society, having been one of the Zoological Club—the parent of that Society. As a teacher, he contributed largely to the cause of popular education. He was associated with Earl Stanhope and Lord Brougham in the first endeavours to establish schools for all, and the present system

of National Education owed much to the warm approval of his system by the Government Commissioners, after several official visits and lengthened communications. Mr. Chambers was the author of many works connected with education; he was an early member of the Society of Arts, an enthusiastic admirer of the fine arts, occasionally a public critic on the subject, and formed a choice collection of works by British artists. Besides his personal friends and relatives, some thousands of pupils, many now rising in the ranks of literature, science, and the arts, will recall with pleasure the instructions they received from his amply stored mind, his enthusiastic love of nature, his high moral precepts and example, his genial kindness, and his energetic endeavours to sow and foster the seeds of all worthy knowledge. The last ten years of his life were passed in retirement, and he died at Balderton, in Nottinghamshire, Dec. 20th, 1858, in the 74th year of his age.

John Samuel Gaskoin, Esq., was born at Bagshot in Surrey in September 1790, and received his education at a private school. At the age of sixteen he became a house-pupil of the Marylebone Infirmary, and subsequently attended the necessary lectures, together with the hospital practice of St. George's, St. Bartholomew's, and the Westminster Lying-in Hospital. In 1816 he went to Paris, where he remained about two years, still prosecuting his medical studies. On his return to London he established himself in practice, and in 1823 he was appointed Surgeon in Ordinary to King George the Fourth at Brighton, and in 1830 received a similar appointment to King William the Fourth. He was for many years Surgeon to Her Majesty's Theatre, Consulting Surgeon to the London Infirmary for Diseases of the Skin, and Honorary Surgeon to the Royal Freemason's Institution for Female Children. His attachment to Natural History, and especially to Conchology, led him to form a considerable collection of shells, which was particularly rich in the species of *Cypræa*, *Marginella*, and *Columbella*; and several Papers "On New Species of *Cypræa*" in the 'Proceedings of the Zoological Society,' bear witness to the extent both of his collections and of his scientific knowledge of them. He became a Fellow of the Linnean Society in 1853, and, as a frequent attendant at our meetings, was well known to a large number of our members as an amiable man of large information, and a very agreeable companion. In the Zoological Society and at the Art Union he also took an active part. He died suddenly of disease of the heart, at his house in Clarges Street, May Fair, while engaged in writing down the description of some shells

in his cabinet, on the evening of the 5th of October, 1858, in the 69th year of his age.

Thomas Charles Harrison, Esq., was the son of William Harrison, Esq., Q.C., a respected Fellow of our Society, of whom a short obituary notice is contained in the Anniversary Proceedings for 1842. The son, who became a Fellow of the Linnean Society in 1821, was placed by his father in the Treasury, of which he was Counsel, and became Principal Clerk in that department of the public service, after the murder of Mr. Drummond. He became F.R.S. in 1845, was a frequent attendant at our meetings, and, besides an inclination for Natural History, had a considerable taste for the fine arts, and had formed a valuable collection of paintings. He died on the 2nd of May, 1858, at the age of 65.

Robert George Holland, Esq., M.D., became a Licentiate of the Society of Apothecaries in 1817, and a Fellow of the College of Physicians in Edinburgh in 1838. In the same year he was elected a Fellow of the Linnean Society. He practised for many years as a Physician at Sheffield, and died on the 18th of November, 1857, at Hornsey Lane, near London.

The Rev. John Howson, M.A., was born at Giggleswick, near Settle in Yorkshire, in 1787, and was educated in the Grammar-school of that place, of which he himself was afterwards Second Master for the long period of forty-five years. This is the school at which the celebrated Archdeacon Paley was educated; and the Archdeacon's father was Head Master when Mr. Howson's studies began there. Giggleswick is close to the great Craven fault in the West Riding. Mr. Howson was an ardent lover of nature in all her aspects; and many were the rambles which he used to take with his pupils over a district peculiarly rich in botanical treasures. He became a Fellow of the Linnean Society in 1822, and died at Giggleswick on the 23rd of January in the present year, at the age of 72.

Sir Henry John Lambert, Bart., was born on the 5th of August, 1792, and in 1803 succeeded his father in the baronetcy. In 1820 he became a Fellow of the Linnean Society, and was also a Fellow of the Horticultural. He died at his seat, Aston Hall, Tetsworth, in the county of Oxford, on the 17th of December last, in the 67th year of his age.

Edward Moore, Esq., M.D., was the youngest son of Joseph Moore, Esq., of Plymouth, and was born in that town in the year 1794. He was principally educated at the Grammar-school at Plympton, and commenced his medical studies at Honiton. In

1815 he was admitted a Member of the Royal College of Surgeons in London; in 1827 M.D. of the University of Edinburgh; and in 1828 he became a Fellow of the Linnean Society. He was for many years surgeon of the North Devon Militia, and was one of the founders of the Plymouth Infirmary for Diseases of the Eye, of which he continued for thirty-three years to act, first as surgeon, and afterwards as physician, and to which he bequeathed a considerable legacy. The Plymouth Athenæum also owed much to his exertions: he was for many years actively employed as its Secretary, and was also a Vice-President, and for a time President. Here he lectured repeatedly on a great variety of scientific subjects. Up to the last he continued to devote his attention to its Museum as Curator of the Geological Collection, the arrangement of which was among his latest acts. He attached himself also more especially to the study of zoology in several of its departments, and contributed numerous papers to scientific periodicals on zoological and geological subjects. Those enumerated in the 'Bibliographia Geologiæ et Zoologiæ' of the Ray Society are as follows:—

1. On a new British Fish.—*Mag. Nat. Hist.* ser. 2. vol. i. p. 17.
2. On the Birds of Devonshire.—*Ibid.* pp. 113, 176, 227, 319, 361.
3. On the Change of Plumage in the Guillemot.—*Ibid.* p. 607.
4. On the occurrence of the *Teredo navalis* and *Limnoria teredrans* in Plymouth Harbour.—*Ibid.* vol. ii. p. 206.
5. Notice on the Pilot-fish (*Naucratus ductor*).—*Ann. & Mag. Nat. Hist.* vol. viii. p. 316.
6. Catalogue of the Malacostracous Crustacea of South Devon.—*Mag. Nat. Hist.* ser. 2. vol. ii. p. 284.
7. On the Discovery of Organic Remains in a raised Beach in the Limestone Cliff under the Hoe at Plymouth.—*Rep. Brit. Assoc.* 1841, Sect. p. 62, &c.

In the pursuit of these various branches of study, he was in frequent correspondence with Yarrell, De la Beche, Buckland and others, to whom he communicated many important facts. For the last four years of his life he was a Magistrate of his native town; and the estimation in which he was there held may be judged from the fact that his funeral was escorted by a numerous attendance of all the public bodies, the Members of the Medical Society, the Literary Institution, &c. He died at his residence in Athenæum Terrace, on the 17th of July, 1858, at the age of 64.

The Right Hon. Frederick John Robinson, first Earl of Ripon.

was the younger son of Thomas second Lord Grantham, and was born in London, on the 30th of October, 1782. From Harrow, where he was contemporary with Peel, Aberdeen, Palmerston, and Byron, he proceeded to St. John's College, Cambridge, where he graduated as M.A. in 1802. In 1804 he became Private Secretary to his relative Lord Hardwicke, then Lord Lieutenant of Ireland; and from this time forward filled a variety of different offices in successive Administrations, until on the death of Canning in 1827, he became for a short time Prime Minister. On the formation of the Ministry of Earl Grey in 1830, he again returned to office, and continued, with brief intervals of retirement, to fill various cabinet offices, until the close of Sir Robert Peel's Administration in 1846, when he finally retired into private life. His Lordship married in 1814 Lady Sarah Hobart, only daughter of the late Earl of Buckinghamshire, by whom he leaves one only surviving child, George Frederick Samuel, the present Earl, also a respected Fellow of our Society, of the Council of which he has been an active member. The late Earl became Fellow of the Linnean Society in 1852, and died on the 28th of January in the present year, at his seat at Putney Heath, in the 77th year of his age.

Three years ago it was my duty to record the death of an old and valued Fellow of the Society, the late Mr. Thomas Salter, of Poole, in Dorsetshire, and to offer a slight tribute of respect to his memory. I have now to add to our list of deaths for the present year the name of his eldest son, *Thomas Bell Salter, Esq., M.D.*, of Ryde, in the Isle of Wight, an amiable and accomplished man, a distinguished medical practitioner, an able naturalist, and nearly connected with us as the sister's son of our excellent President. He was a Doctor of Medicine of the University of Edinburgh, Licentiate of the Royal College of Surgeons of that City, Member of the Royal College of Surgeons of England, and for twenty years practised at Ryde, where he was one of the original promoters of the Infirmary, to which he gave his gratuitous services up to the time of his death. In early life he commenced the formation of a Herbarium both of British and Foreign Plants, which became of considerable extent, and which his brother, Dr. James Salter, F.L.S., has since his death liberally presented to the Linnean Society. This herbarium, among other valuable plants, is particularly rich in the forms of the genus *Rubus*, on which Dr. Bell Salter particularly worked, and in regard to which he was regarded as the highest authority. His papers on Botanical sub-

jects are chiefly contained in the 'Phytologist,' and in the 'Botanical Gazette,' and the following is a list of them, as far as they are known to me:—

1. A Note on the Weymouth Stations of *Lathyrus Nissolia* and *Salicornia radicans*.—*Phytologist*, vol. i. p. 866.
2. On the effects of Cultivation on *Hyacinthus non-scriptus*.—*Phyt.* vol. i. p. 988.
3. Three days' botanizing at Selborne.—*Phyt.* vol. i. p. 1132.
4. Note on the *Filix-femina* as a Tree-fern.—*Phyt.* vol. i. p. 1141.
5. Observations on the genus *Rubus*.—*Phyt.* ii. pp. 87, 97, 131, 198.
6. On the yellow juice of *Oenanthe crocata*.—*Phyt.* ii. p. 116.
7. Remarks on the *Calamintha sylvatica* of Bromfield.—*Phyt.* ii. p. 171.
8. On the meaning of the word *recurvus*.—*Phyt.* ii. p. 200.
9. On the fertility of certain Hybrids. Read before the Isle of Wight Philosophical Society.—*Phyt.* ii. p. 737.
10. Effects of the mildness of the present Season (the Winter of 1852–53).—*Phyt.* iv. p. 847.
11. A Descriptive Table of British Brambles.—*Henfrey's Botanical Gazette*, vol. ii. pp. 113, 147.

Of all these the most important, next to his Papers on *Rubi*, are his observations on hybrids, the fertility of which he tested in the genera *Epilobium* and *Geum*, through numerous generations. On the death of his friend and neighbour Dr. Bromfield, he was requested, in conjunction with Sir W. J. Hooker, to undertake the publication of the elaborate materials collected by that lamented Botanist for a Flora of the Isle of Wight, which was published in 1856, by their joint care, under the title of 'Flora Vectensis.' In this work he naturally took great interest, having for ten or twelve years worked side by side with Dr. Bromfield, and he added much to its value by his own observations. Dr. Bell Salter became a Fellow of the Linnean Society in 1837, he was married only in the February of last year, and died on the 30th of September last, at the age of 44, at the house of his brother-in-law, Dr. Lake, of Southampton, after a very short illness. "A more kind or generous spirit," says the writer of a notice in a local paper, "never breathed; while his vast erudition threw a charm round his society for the like of which we shall have long to look in vain."

Benjamin Cruttall Pierce Seaman, Esq., of Rotherby and Hoby

in the county of Leicester, was elected a Fellow of the Linnean Society in 1821, and died at his house in Upper Gower Street, London, on the 13th of June, 1858, at the age of 63.

Major Edmund Sheppard, B.A., entered the service in 1806, became Lieutenant in 1808, and served at Walcheren in the following year. From 1814 to 1816 he served in Canada, and was present at several actions. In 1821 he became a Fellow of the Linnean Society; in 1825 he received his commission as Captain, and in 1838 that of Major; and in 1840 he retired upon half-pay. He died on the 6th of November last, at his residence, Rutland House, Kingston-upon-Thames, at the age of 68.

The Rev. Edward Tagart, F.S.A., F.G.S., was born at Bristol in 1804; he was educated at the school of Mr. Evans in that city, and subsequently at the Grammar-school, Bath, where he manifested great aptitude for learning. His parents giving him the choice of a vocation in life, he fixed upon the Ministry, and at the age of 17 was placed at Manchester College, York, the most eminent theological school in the Unitarian connexion, then conducted by Mr. Wellbeloved and Mr. Kenrick—names well known to all classical scholars. Having there completed his education, at the early age of 20 he went to Norwich, and was chosen pastor of the congregation then assembling in the Octagon, one of the oldest and most important in the Presbyterian denomination. Some of the most beautiful of the hymns used there were contributed by the late Sir James E. Smith, President of our Society. Sir James frequently attended Mr. Tagart's ministrations; and the acquaintance thus established ripened into friendship. In 1828 Mr. Tagart removed to London and took charge of a congregation in York Street, St. James's. Supported and strengthened by his efforts, they built for him the chapel in Little Portland Street, where he laboured to the end of his days; and in the religious body to which he belonged no name was more widely known or highly esteemed. He devoted himself zealously to his pastoral duties; and among his hearers were many eminent scientific men. Nor was his influence confined to his own denomination; for his position brought him, politically and socially, into contact with distinguished men of all churches. His pursuits naturally partook of a literary rather than a scientific character; but he contributed some papers to the 'Zoologist.' He was also the author of several works, chiefly biographical; but he particularly devoted himself to the study of Moral Philosophy, and was an ardent disciple of Locke, whose school he vindicated in a

work published in 1855, entitled "Locke's Writings and Philosophy." Mr. Tagart was for many years a Fellow of the Society of Antiquaries and of the Geological Society; but of late he most delighted in the meetings of the Linnean, of which he was elected a Fellow in 1852. Without contributing much to our publications or taking any prominent part in our discussions, he was constant in his attendance, and thus became well known to us all; and his loss will be deeply felt by many of us, to whom he was personally endeared by his genial character and his highly cultivated mind. His views were liberal and enlarged; and he manifested at all times an earnest zeal for the diffusion of science. Returning from Hungary (on a visit undertaken at the instance of the British and Foreign Unitarian Association) he was seized with an aguish fever, and died suddenly at Brussels, on the 12th of October last, in the 55th year of his age.

Richard Taylor, Esq., was born on the 18th of May, 1781, at Norwich. He was the second son (of a family of seven) of John Taylor, wool-comber, and Susan Cooke, and great-grandson of Dr. John Taylor, the author of the celebrated 'Hebrew Concordance.' His education was received at a day-school in Norwich, kept by the Rev. John Houghton, whom he describes as an excellent grammarian and a severe disciplinarian. Under this able tutor and his son, he made early and considerable progress in classical learning, and also acquired some knowledge of chemistry and other branches of natural philosophy. It seems to have been the wish of the master that his pupil should proceed to the High School of Glasgow (where he had himself received his education), and there qualify himself for the ministry; but other counsels prevailed, and, principally at the suggestion of Sir James Edward Smith, the founder of the Linnean Society, and a very intimate friend of his parents, he was induced to adopt the profession of a printer—a profession to which he became ardently attached. On Sir James Smith's recommendation, he was apprenticed to Mr. Davis of Chancery Lane, London, a printer of eminence, from whose press issued many scientific works of importance. During this period of his life, his leisure hours seem to have been employed in the study not only of the classics, but also of the mediæval Latin and Italian authors, especially the poets, of whose writings he formed a curious collection. From these, his "old dumps" as he was wont to call them, he derived great pleasure to the last moments of his life. He also became a proficient scholar in French, Flemish, Anglo-Saxon, and several of the

kindred Teutonic dialects,—a proficiency which afterwards proved of eminent utility in his professional career, by far the greater number of the Anglo-Saxon works, and works connected with that branch of literature, published in London during the last forty years, having issued from his press.

On the expiration of his apprenticeship, he carried on business for a short time in Chancery Lane, in partnership with a Mr. Wilks; but on his birthday in the year 1808, at the age of twenty-two, he established himself, in partnership with his father, in Blackhorse Court, Fleet Street, from whence he soon after removed to Shoe Lane, and subsequently to Red Lion Court. His press speedily became the medium through which nearly all the more important works in scientific natural history were ushered into the world; and the careful accuracy by which all its productions were distinguished led to a rapid extension of its use. It was immediately adopted by the Linnean Society; the Royal Society and many other learned bodies succeeded; individual members naturally followed the example of the Societies to which they belonged; and the same valuable qualities which had rendered it so acceptable to men of science were equally appreciated by those engaged in other pursuits. The beautiful editions of the Classics which proceeded from it, soon rendered his favourite device (the lamp receiving oil, with its motto of "*Alere flammam*") as familiar to all who had received a classical education in England as it had been from the beginning to the world of science. It would be tedious to enumerate even the more important of these works; but there is one in all respects so remarkable as to deserve especial mention. This is the facsimile of the Psalms from the Codex Alexandrinus, edited by the Rev. H. H. Baber, "at whose chambers in the British Museum," says Mr. Taylor in his Diary, under date of the 11th Nov. 1811, "I have collated the proofs of the first and second sheets with the Codex letter by letter, and I intend, if possible, to do the same for all the rest." A more striking proof could not be adduced of his strict attention to the accuracy of his press, and of his persevering devotion even to the minutest duties of his profession. It was by such means, aided by his high moral worth, that he nobly sustained the credit of the profession to which his abilities were devoted, and deservedly acquired the friendship, esteem, and confidence of the large circle of eminent men with whom it brought him into constant and familiar intercourse.

In the year 1807 he became a Fellow of the Linnean Society,

and at the anniversary of 1810 he was elected Under-Secretary, an office which he retained for nearly half a century, and in which he earned for himself the cordial esteem and good-will of every member of the Society. In his Diary, under date of the anniversary of 1849, he notes that he had "served with M^cLeay, Bicheno, Dr. Boott, and Mr. Bennett, under the successive presidencies of the founder Sir J. E. Smith (the intimate and dear friend of my parents and my warm friend), of the Earl of Derby, the Duke of Somerset, and my excellent friend Dr. Stanley, Bishop of Norwich." To the names of the Presidents he might subsequently have added those of Mr. Brown and Mr. Bell; and he must have felt, though he was too modest himself to note it down, how highly he was esteemed by them all for his strict sense of honour, the amiability of his disposition, and his entire devotion to the interests of the Society.

Among the numerous other learned bodies of which he was a member, the Society of Antiquaries, the Astronomical Society, and the Philological were those in which he took the deepest interest. He also attached himself from its commencement to the British Association for the Advancement of Science, nearly all the meetings of which, while his health permitted, he regularly attended. At these pleasant gatherings of the scientific world, in the society of his numerous friends and of those whose names were most distinguished in science, many of the happiest days of his life were passed.

In 1822, he joined Dr. Tilloch as editor of the 'Philosophical Magazine,' with which Dr. Thomson's 'Annals of Philosophy' were subsequently incorporated. In 1838 he established the 'Annals of Natural History,' and united with it, in 1841, Loudon and Charlesworth's 'Magazine of Natural History.' He subsequently (at the suggestion and with the assistance of some of the most eminent members of the British Association) issued several volumes of a work intended especially to contain papers of a high order of merit, chiefly translated, under the title of 'Taylor's Scientific Memoirs.' But his own principal literary labours were in the field of biblical and philological research. In 1829 he prepared a new edition of Horne Tooke's 'Diversions of Purley,' which he enriched with many valuable notes, and which he re-edited in 1840. In the same year (1840), Warton's 'History of English Poetry' having been placed in his hands by Mr. Tegg, the publisher, he contributed largely, in conjunction with his friends Sir F. Madden, Benjamin Thorpe, J. M. Kemble, and others, to

improve the valuable edition published in 1824 by the late Mr. Richard Price.

For five-and-thirty years he represented the ward of Farringdon Without (in which his business premises were situated), in the Common Council of the City of London, and constantly paid strict attention to his representative duties. Of all the objects which came under his cognizance in this capacity there were none which interested him more deeply than questions connected with education. He took an active part in the foundation of the City of London School, and the formation of the Corporation Library; and warmly promoted the establishment of University College and of the University of London. His politics were decidedly liberal; but his extended intercourse with the world, and the natural benevolence of his character, inclined him to listen with the most complete tolerance to the opinions of those who differed from him; and he reckoned among his attached friends many whose political opinions were strongly opposed to his own.

Early in the summer of 1852 his health gave way, and he found it necessary to withdraw from the excitement of active life. He settled down at Richmond, and once more gave himself up to Ovid, Virgil, and his old friends Paulus Manutius, Justus Lipsius, Ochinus, Fracastorius, &c. Increasing years brought increasing feebleness; and the severe weather of November last brought on an attack of bronchitis, of which he died suddenly on the 1st of December, in the 78th year of his age.

The Society has to record the loss, at a very advanced age, of one among the oldest of its members, in the death of *Dawson Turner, Esq.*, which took place at Brompton on the 20th of June in the last year. He was born at Great Yarmouth, on the 18th of October, 1775, and was the eldest son of Mr. James Turner, banker, in that place, by Miss Elizabeth Cotman, of Ormesby, Norfolk. For his classical attainments Mr. Turner was mainly indebted to his private tutor, the Rev. Robert Forby, of Forncet, Norfolk. He entered, indeed, at Pembroke College, Cambridge, of which his uncle, the Rev. Joseph Turner, Dean of Norwich, was master; but instead of continuing his studies at the University, he was called, by the death of his father, to take, at a very early age, an active part in the well-known bank of Gurneys and Turner, Great Yarmouth. Mr. Turner's love of literature and of languages, especially Latin and Greek, Italian and German, in all of which he was a great proficient, never forsook him; and to these he added, successively, various other pursuits, indicative

of a highly cultivated mind, and all of which he followed with much enthusiasm and success. His early residence in the country, and in a district abounding with wild plants, and the fact of his tutor's partiality to botany (as testified by Sir James Smith, when dedicating a new species of Willow (*Salix Forbyana*) to him), gave him a taste for Natural History in general, and especially for collecting and investigating the vegetable productions of the neighbourhood. This branch he studied with great ardour; and, nothing deterred by the difficulty of the subject, after attaining a competent knowledge of British Phanogamous plants, he devoted his attention to the *Cryptogamia*. Perhaps in consequence of his residence upon the sea-coast, Mr. Turner was chiefly attracted by the *Algæ*; and there cannot be a doubt that his 'Synopsis of the British Fuci,' published in 1802, contributed largely to encourage the study of the sea-weeds of our own islands, by the accuracy of its descriptions, and, being written in a popular form, by the elegance of the composition.

The 'Synopsis of British Fuci' was quickly followed, in 1804, and after a tour in Ireland which afforded a rich harvest of Mosses, by his 'Muscologiæ Hibernicæ Spicilegium,' with 16 coloured plates of new species, the descriptions and preface written entirely in Latin.

Mr. Turner's third botanical work was prepared in conjunction with his late intimate friend, Lewis Weston Dillwyn, Esq., of Swansea, and was entitled "The Botanist's Guide through England and Wales," in 2 vols. 8vo: it was the result of many botanical tours in various counties, and of communications of notes and specimens from numerous correspondents. His object was now to undertake a general history of sea-weeds, foreign as well as British, with coloured figures of all the species, and full descriptions in Latin and English, entitled "Fuci, sive Plantarum Fuco-rum Generi a Botanicis ascriptarum Icones, Descriptiones et Historia." It was undoubtedly the most distinguished and laboured of all his publications—commenced in 1808 and concluded in 1819, in four volumes, large quarto and folio, with 258 plates, many, and those the best of them, from the pencil of his accomplished lady, Mrs. Turner. This valuable and highly meritorious work, unfortunately for botany, and unfortunately for Mr. Turner's rising fame in that direction, was the last he ever published on a science he fondly loved and continued to love and to talk of with more pleasure than on any other subject, so long as his declining faculties permitted him. He apologizes, in the closing page of

the 'Fuci,' for bringing the book to a conclusion in such an imperfect state. "It is," he says, "principally attributable to the more than usual progress made of late years in the knowledge of this branch of Natural History, which, by the numerous expeditions in quest of science, has been extended to such a degree that it is difficult to imagine what number of species may ultimately be found; so that, though the present publication has already far exceeded the limits originally contemplated, it ends incomplete, leaving the feeling that our knowledge is in its infancy, and that, till more is seen, the point which the author had principally in view, that of reducing the marine species in general under natural families, in a well-organized system, cannot be satisfactorily accomplished. Various attempts have, meanwhile, been made to bring this interesting tribe of plants under a new arrangement; and one in particular, by M. Lamouroux, embracing a comprehensive view of the subject, is entitled to great credit. To these, however, the author is not ambitious of adding, but rather finds satisfaction in taking leave of his readers, with the consciousness of having laid before them a set of figures upon the accuracy of which they may rely, and which, as representations of things that are, will, through every change of human opinions, retain an undiminished value, while they may serve, in the hands of some abler and more fortunate successor, as the ground-work of that which he had hoped to have accomplished himself." Such successors (and Mr. Turner lived to hail the results of their systematic labours) have been found in Agardh and Harvey, who have not failed to record their obligations to the work thus briefly noticed.

The above-mentioned publications constitute, however, but a small part of the services rendered to botany by Mr. Turner, as Sir James Smith's 'English Botany,' and 'Flora Britannica' and 'English Flora,' and, we may add, the volumes of our own Transactions can testify: he did still more, by encouraging in the pursuit of science every young Naturalist who came in his way, welcoming him to his table, assisting him by the use, and often by presents, of books, and by advice and money, if needed. He possessed an extensive library, rich in works on the Fine Arts and Literature, as well as in Botanical publications. He joined with Mr. Borrer, so well known in our Society, in the preparation of a work upon Lichens, of which only a small portion was printed, for private circulation, extending to 167 pages, under the title of 'Lichenographia Britannica,' but which, if continued as it was

begun, would have reflected great credit on both the individuals concerned in it. The removal of more than one friend of congenial tastes from the vicinity of Yarmouth contributed perhaps to lessen Mr. Turner's devotion to the study of plants.

But a mind so highly cultivated and endowed as his was, with a degree of health and strength of physical and intellectual powers beyond most men, would not suffer him to allow the time which could be spared from business to pass unemployed. Besides general literature, he studied and collected pictures, coins, medals, autographs of sovereigns and distinguished people, antiquities, county histories (that of his native county, Norfolk, above all), to an extent which need not be further alluded to here, but which is fully acknowledged by all who have been interested in such pursuits. From his earliest career, and for a period of nearly sixty years, he carried on a most extensive literary and scientific correspondence, all of which he preserved and arranged chronologically. Could those letters from the numerous and eminent European botanists of the time be collected together, they would contribute much information on the state of natural science during the first twenty years of the present century, including the period of the last twenty years of the lives of Sir Joseph Banks, and of the first President of our Society, Sir James Smith. Indeed, Mr. Turner long meditated, but never accomplished, the publication of a memoir of our great Mæcenas, intending it to comprise a history of the progress of botany up to the death of that distinguished man.

Mr. Dawson Turner was in his 83rd year at the time of his decease: the grave closed over him and Robert Brown within a few days of each other,—the one a zealous, and for a while indefatigable, and the last of the botanists of the old or Linnean school; the other the most distinguished promoter of the new or Jussieuan method.

Mr. Turner became a Fellow of the Linnean Society in 1797, and had been upwards of 61 years a member at the time of his decease. The following is a list of his Papers in our 'Transactions':—

Calendarium Plantarum Marinarum.—Vol. v. p. 126.

Descriptions of four new species of *Fucus*.—Vol. vi. p. 125.

Descriptions of four new British Lichens.—Vol. vii. p. 86.

Remarks upon the Dillenian Herbarium.—Vol. vii. p. 101.

Description of a new species of Lichen.—Vol. viii. p. 260.

Descriptions of eight new British Lichens.—Vol. ix. p. 135.

And in conjunction with Mr. James Sowerby,

Catalogue of some of the more rare plants observed in a tour through the Western Counties of England, made in June 1799.—Vol. v. p. 234.

The following Notices relate to the eminently distinguished men whose places have become vacant in the list of our *Foreign Members*:—

Carl Adolph Agardh, Bishop of Carlstad and Knight of the Polar Star, distinguished as a botanist, a statesman, and a theologian, was the son of a shopkeeper in the town of Bartad, in the Swedish province of Halland, where he was born on the 23rd of January, 1785. He became, in 1799, a student of the University of Lund, and published his inaugural dissertation, entitled "*Cari-cographia Scanensis*," in 1806. In the following year, at the age of two-and-twenty, he was appointed Professor of Mathematics; but his scientific studies continuing to take the direction indicated by his earliest work, he proceeded to Stockholm, where, under the superintendence of Swartz, he devoted himself to the study of Cryptogamic plants. After making a tour through Denmark, Northern Germany, and Poland, he returned to Lund, and in 1812 became Professor of Botany and Practical Economy in that University. In 1816 he took holy orders, and was immediately named pastor of St. Peter's Kloster; and in the diets of 1817, 1823, and 1834, he sat as deputy for his diocese. In 1821, he undertook a scientific journey through Denmark, Germany, Holland, and France; and in 1827 he travelled through part of Germany and Italy. During all this period he was actively engaged in the publication of his botanical labours, especially in reference to the family of *Algæ*, a group of plants which, by his persevering and successful investigation, he made peculiarly his own, and the systematic arrangement of which he entirely remodelled. He was chosen a Member of the Royal Academy of Sciences at Stockholm in 1818; in 1824 he was decorated with the Order of the Polar Star; and in 1825 he was called to Stockholm as a member of the great Committee then formed for the organization of a new system of public instruction. In 1833, he paid a visit to England, and in the same year he was elected a Foreign Member of the Linnean Society. On his elevation to the bishopric of Carlstad in the following year, he resigned his Professorship in the University; and from this time forward he almost ceased his botanical labours, devoting himself chiefly to his public and religious duties. His

principal botanical works are his "Dispositio Algarum Sueciæ," Lund, 1810-12; "Algarum Decades i.-iv.," Lundæ, 1812-15; "Synopsis Algarum Scandinaviæ," Lundæ, 1817; "Aphorismi Botanici," Lundæ, 1817-25; "Icones Algarum Ineditæ," Lundæ, 1820-22; "Species Algarum ritè cognitæ," Gryphis, 2 vols. 1823-28; "Systema Algarum," Lundæ, 1824; "Classes Plantarum," Lundæ, 1825; "Icones Algarum Europæarum," Leipzig, 1828-35, and "Lärobok i Botanik," Malmö, 2 vols. 1829-32, the last translated into German under the title of "Lehrbuch der Botanik," Kopenhagen, 1831-32. Among the eminent men whom Sweden has produced since the days of Linnæus, Bishop Agardh unquestionably takes a very high rank. In investigation he was laborious and accurate, in his views of arrangement careful and clear-sighted, in his speculations bold and frequently successful. His writings on mathematics and political economy are not within our sphere; but they are spoken of by his countrymen as valuable and instructive contributions to the sciences to which they relate. Of his extensive acquirements, of the frankness of his manners, and the kindness of his disposition, there are many among us who retain a vivid recollection. He married Charlotta Lindskog, the daughter of a tradesman in Lund, and died at Carlstad on the 28th of January last, having just completed his 74th year, leaving one son, Jacob Georg, who, following in the footsteps of his illustrious father, has earned for himself high distinction among the cultivators of botanical science.

Aimé Bonpland, the companion and friend of Humboldt, was born at Rochelle on the 22nd of August, 1773, and was educated for the medical profession. In the spring of 1798, when Alexander von Humboldt visited Paris, he found Bonpland, then one of the most promising students of the École de Médecine and of the Jardin des Plantes, busily preparing, in company with Michaux, to take part under Captain Baudin in a Voyage of Discovery to South America. With this enterprise he eagerly associated himself, and soon became warmly and intimately attached to the companions of his intended voyage, and especially to Bonpland. The expedition, however, being set aside for want of funds, the two friends, after a fruitless attempt to join the *corps* of French *savans* then assembled in Egypt, determined to pass the winter together in Spain, and in January 1799 proceeded to Madrid. Here, through the intervention of the Saxon minister, they were introduced to the king, by whose orders every possible facility was afforded them for prosecuting that extensive journey through the Spanish domi-

nions in Mexico and South America, which now presented itself to their minds as the most suitable means of satisfying their ardent desire for scientific travel and research, and on which they embarked at Corunna in May 1799. It is needless to follow the steps of the distinguished travellers through this celebrated journey, the immense results of which have been made known in a multitude of splendid publications, forming the most elaborate and magnificent series that have ever arisen out of a single undertaking. It may be sufficient to say that the botanical collections alone, with which Bonpland chiefly concerned himself, amounted to upwards of 6000 species, and were published partly in the "*Plantes Equinoxiales*," 2 vols. fol., Paris, 1808-9; in the "*Monographia Melastomacearum*," 2 vols. folio, 1806-23; and, with the cooperation of Kunth, in the "*Nova Genera et Species Plantarum Americæ Equinoctialis*," 7 vols. folio, Paris 1815-25; in a "*Synopsis*" of the same work in 4 vols. 8vo, Paris, 1822-25; in the "*Mimoses et autres Plantes Légumineuses*," fol. Paris, 1819-24; and in the "*Distribution Méthodique des Graminées*," 2 vols. fol. Paris, 1835. The travellers arrived at Bordeaux on their return to Europe in August 1804, having been absent rather more than five years; and for the next twelve years Bonpland resided in or near Paris, busied in the arrangement of the collections, and in superintending the various publications connected with them. Soon after his arrival in France he was appointed to the charge of the Botanic Garden maintained by the Empress Josephine at Malmaison, and published in connection with it a splendid work, entitled "*Description des Plantes rares cultivées à Navarre et à Malmaison*," fol. Paris, 1813-17. On the fall of the Emperor Napoleon, however, his passion for foreign travel appears to have revived; and in 1818 he again quitted Europe, with the title of Professor of Natural History at Buenos Ayres. Here he did not long continue in a state of repose, but commenced in 1820 a new journey into the interior, with a visit to a colony of Indians which he had founded at Santa Anna on the banks of the River Paraguay, for the purpose of cultivating the Yerva de Paraguay, or Paraguay Tea, regarded throughout South America almost in the light of one of the necessities of life. At this place he was seized and made prisoner by the orders of Dr. Francia, who had founded in Paraguay a singular dictatorship on the ruins of the Jesuit power in that province, and who totally destroyed the plantations made by Bonpland, with the view of securing to himself the monopoly of the cultivation to which they were devoted. By his orders Bonpland was carried to

Santa Martha, in which place he was restored to partial liberty, and permitted to act as a kind of garrison-physician to the dictator's troops. It was not until 1829 that, after the strongest instances, he was permitted to return to Buenos Ayres, when his friends warmly welcomed his restoration to liberty, under the hope that he would immediately return to European society. In this expectation, however, they were disappointed: it would appear that his long residence in South America had generated a preference for his adopted country, in which he remained until his death. This event took place at St. Francisco de Borja, a small Brazilian town on the eastern borders of Entre Rios, at no great distance from Uruguay, where he had resided since 1831. He died on the 4th of May in the year 1858, in the 85th year of his age, leaving behind him so high a character, not only as a talented and accomplished naturalist, but as an amiable and estimable man, that the British community at Buenos Ayres determined to erect a suitable monument to his memory. He was unquestionably one of the most distinguished men belonging to what Prof. von Martius has aptly denominated the peripatetic age of botany; and his death, at so great a distance both of time and space from the scene and period of his active labours, warns us strongly how few are the links that still remain to bind us to that interesting and important epoch in the history of botanical science.

I had written the last sentence—one as it would almost appear of melancholy foreboding—on the morning of the day on which the evening papers brought us the sudden and unexpected intelligence of the death of *Baron Alexander von Humboldt*, the friend of Robert Brown, the still more intimate friend of Bonpland, and the oldest survivor of that generation of inquirers into nature, who commencing their investigations before the close of the last century, have continued them through more than half of the present. This event completing the muster-roll of illustrious names of whom death has deprived us during the past year, has come upon us so suddenly and so recently that I must entreat the pardon of the Society if I fail to pay a fitting tribute of respect to the memory of one so eminently distinguished, not only in the sciences which we especially cultivate, but in every science connected with the great and comprehensive study of nature in its widest sense. To attempt, within the short space of time which I could command, to give the merest outline of his labours and of his merits, would be in the highest degree presumptuous. I feel too, that the task of doing justice to the character of so great a man will naturally fall

to hands far abler than my own; and to those hands I cheerfully resign it. I will therefore only add that Alexander von Humboldt was born at Berlin on the 14th of September, 1769, was elected one of the eight Foreign Associates of the Academy of Sciences of the Institute of France, in the place of Cavendish, in 1810, became a Foreign Member of the Royal Society in 1815, and a Foreign Member of the Linnean Society in 1818, and died at Berlin on the 6th of May in the present year, in the 90th year of his age.

Lastly, we have to record the deaths of two of our *Associates*:—

Mr. Samuel Stutchbury was the son of a dealer in mathematical instruments in the City of London, and early attached himself to Natural History pursuits. In 1825 he was engaged, in the capacity of Natural History collector, to accompany an expedition fitted out for the purpose of fishing for Pearls in the Pacific Ocean, and soon after his return became Curator of the Bristol Philosophical Institution, which office he retained for many years. In 1842 or 1843 he went out to New Holland with a geological appointment, and returned about two years ago, bringing with him considerable collections in various departments of Natural History. He was elected an Associate of the Linnean Society in 1828, and contributed two Papers to our 'Transactions;' one entitled "An Account of the Mode of Growth of Young Corals of the genus *Fungia*," vol. xvi. p. 493; and the other, a "Description of a new species of the genus *Chamaeleon*," vol. xvii. p. 361. Besides these, he was author of the six following Papers:—1. "On two new genera of Testaceous Mollusca," *Zool. Journ.* v. p. 95; 2. "On *Cypræassia*," *Mag. Nat. Hist.* ser. 2. i. pp. 214, 470; 3. "On a new fossil *Avicula*," *Ibid.* ii. p. 163; 4. "On a new genus of Fossil Bivalve Shells (*Pachyodon*)," *Ann. and Mag. Nat. Hist.* viii. p. 481; 5. "On a new Sponge from Barbadoes (*Dactylocalyx pumiceus*)," *Proc. Zool. Soc.* ix. p. 86; 6. "On a new species of *Plesiosaurus* in the Museum of the Bristol Institution," *Journal of the Geological Society*, ii. p. 411. Of the last-named Society he was a Fellow. He returned from Australia in dilapidated health, and died at Bristol on the 12th of February in the present year, at the age of 61.

Of *Mr. Thomas Turner*, of Eton College, I only know that he was elected in 1832, and died in the autumn of 1858.

At the Election which subsequently took place, Thomas Bell, Esq., was re-elected President; Francis Boott, Esq., M.D., Treasurer; John Joseph Bennett, Esq., Secretary; and George Busk, Esq., Under- (Zoological) Secretary. The following five Fellows were elected into the Council in the room of others going out: viz., Frederick Currey, Esq., F.R.S.; Prof. Grant, F.R.S.; Thomas Corbyn Janson, Esq.; Prof. Lindley, F.R.S.; and Sir Charles Lyell, F.R.S.

The President nominated George Bentham, Esq., Francis Boott, Esq., M.D.; Richard Owen, Esq., D.C.L.; and William Wilson Saunders, Esq., Vice-Presidents for the ensuing year.

Among the presents announced, was that of an extensive series of conchological works not previously existing in the Society's Library, presented by Hugh Cuming, Esq., F.L.S., to whom the special thanks of the Society were directed to be offered for his valuable present.

June 2nd, 1859.

Thomas Bell, Esq., President, in the Chair.

William Camps, Esq., M.D., was elected a Fellow.

Read, first, "Notes on *Homalium*;" by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. iv. p. 31.)

Read, secondly, a "Revision of *Dalbergiæ*;" by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. iv. p. .)

Read, thirdly, a Letter from Charles Knight, Esq., F.L.S., "On the Common Slug of New Zealand." (See "Transactions," vol. xxii. p. .)

Read, fourthly, a "Catalogue of the Dipterous Insects collected by Mr. A. R. Wallace at Makassar in the Island of Celebes;" by Francis Walker, Esq., F.L.S. (See "Zoological Proceedings," vol. iv. p. 90.)

Read, fifthly, a second Letter from Mr. Charles Barter on the Vegetation of Western Africa, addressed to Sir W. J. Hooker, F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv. p. 23.)

June 16th, 1859.

Thomas Bell, Esq., President, in the Chair.

Edward Bradford, Esq.; the Venerable Archdeacon Hale; M. H. Lackersteen, Esq., M.D.; J. T. Llewelyn, Esq.; Dr. George Rolleston; and David Williams, Esq., were elected Fellows.

The special thanks of the Society were ordered to be given to the President for his present of a valuable series of physiological works, not previously in the Society's Library.

Read, first, a "Revised Synopsis of the *Distomida*;" by T. Spencer Cobbold, Esq., M.D., F.L.S. (See "Zoological Proceedings," vol. iv. p. .)

Read, secondly, a Memoir "On the structure of the Pitcher in the genus *Nepenthes*; with the description of several new species from Borneo;" by Joseph Hooker, Esq., M.D., F.R.S., F.L.S. (See "Transactions," vol. xxii. p. .)

Read, thirdly, a "Synopsis of the Indian species of *Impatiens*;" by J. D. Hooker, Esq., M.D., F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv. p. .)

Read, fourthly, a "Description of a New Genus of *Balanophorea*;" by Dr. Hooker. (See "Transactions," vol. xxii. p. .)

Read, fifthly, a "Description of the genus *Propiera* of Bouton;" by Dr. Hooker. (See "Botanical Proceedings," vol. iv. p. .)

Read, sixthly, Notes "On *Leopoldinia Piassaba*, Wallace;" by Richard Spruce, Esq. Communicated by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. iv. p. 58.)

Read, seventhly, a Notice "On the cultivation of the Cocoa-nut in Ceylon;" by the Rev. Thomas Foulkes, in a letter to Sir W. J. Hooker, F.R.S., F.L.S.

Read, eighthly, a Memoir "On the Embryogeny of Endogens;" by Benjamin Clarke, Esq., F.L.S. (See "Transactions," vol. xxii. p. .)

Read, ninthly, "Miscellaneous Notes on Various Plants;" by Benjamin Clarke, Esq., F.L.S. (See "Transactions," vol. xxii. p. .)

Read, tenthly, a "Memoir "On East Indian *Salices*;" by Prof. N. J. Andersson. Communicated by Joseph Hooker, Esq., M.D., F.R.S., F.L.S. See "Botanical Proceedings," vol. iv. p. 39.)

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[Continued from Vol. III. page lxxi.]

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JOURNAL OF THE PROCEEDINGS
OF THE
LINNEAN SOCIETY OF LONDON.

On the dermal armour of *Jacare* and *Caiman*, with notes on the Specific and Generic Characters of recent *Crocodylia*. By T. H. HUXLEY, Esq., F.R.S., F.L.S., Prof. of Nat. History, Gov. School of Mines.

[Read Feb. 17th, 1859.]

IN the course of a recent investigation into the nature of the singular extinct reptile, *Stagonolepis*, I was led to inquire somewhat minutely into the character of the exoskeleton, or dermal armour, of the existing *Crocodylia*. To my surprise, I found that very little detailed information on this subject was to be obtained from the standard repertories of Comparative Anatomy, or even from the special monographs on Crocodilian structure and classification; but I was still more astonished to discover, among whole genera of recent *Crocodylia*, an exoskeleton possessed of characters such as have been universally supposed to be peculiar to long extinct forms of the order, and whose existence in any recent species has hitherto, so far as I can ascertain, been completely overlooked.

The attempt to discover the limits within which this remarkable exoskeleton is to be found, led me to look, more critically than I had previously done, into the arrangement and specific characterization of the recent *Crocodylia*. I have thereby arrived at results which, imperfect as they are, may be of service by leading others to inquire into the exact characters of species not at present within my

reach; and I therefore propose to preface my account of the peculiarities of the exoskeleton in two of the genera of recent Crocodiles with some remarks on the classification of the group, and with a few notes upon the characters of the species and the limits of the genera.

Everyone is acquainted with the great improvement effected in this branch of Herpetology by Cuvier, who divided the Crocodiles, which he regarded as constituting only a single genus, into the three subgenera *Alligatores*, *Crocodili*, and *Longirostres*. Subsequent writers have admitted these highly natural subdivisions; but there has been a constant tendency to raise their rank. The genus *Crocodilus* has become the order *Crocodilia*; the subgenera *Alligatores*, &c., have been elevated into families; Dr. Gray has shown that the *Alligatores* must be divided into three genera, and that there are at least two genera of *Crocodili*; and, while one of Cuvier's species of *Longirostres* has been suppressed, the group is very generally retained with a changed name (*Gavialis*), a very important addition having been made to it in the *Crocodilus Schlegelii* of Müller and Schlegel.

Unless the considerable materials contained in the British Museum, the Hunterian collection, the collection of Dr. Grant, and the Christchurch Museum at Oxford had been freely placed at my disposal, I should have been wholly unable to acquire the information contained in the following pages. It is only right, therefore, that I should take this opportunity of offering my thanks to my friends Dr. Gray, Prof. Quekett, Dr. Grant, and Dr. Rolleston for the many facilities they have liberally afforded me.

The recent species of the order *Crocodilia* are divisible into three families, which correspond with the original subgenera of Cuvier, and may be termed the *Alligatoridae*, the *Crocodilidae*, and the *Gavialidae*.

I. In the ALLIGATORIDÆ the teeth are strong and unequal, and the posterior ones differ greatly in shape from the anterior. The anterior pair of mandibular teeth, and the fourth pair (or the so-called canines) are received into pits in the margins of the premaxilla and maxilla; while the mandibular teeth behind these pass inside, and not between, the maxillary teeth. The mandibular symphysis does not extend back beyond the level of the fifth tooth, and often not nearly so far. The line of the premaxillo-maxillary suture on the palate is straight, or convex forwards. The wide posterior nares look downwards, and are situated forwards on the palate.

This family embraces three genera, readily distinguishable by osteological characters—*Alligator*, *Caiman*, and *Jacare*.

Genus 1. ALLIGATOR.

Dental formula, $\frac{20-20}{20-20}$. 9th maxillary tooth the largest of its series. The snout is very broad, flattened, and rounded at the end. There is an indistinct longitudinal interorbital ridge; and there are two short ridges along the line of junction of the prefrontal and lachrymal bones. The aperture of the external nares is divided into two parts, by the prolongation forwards of the nasal bones. The supra-temporal fossæ are well-marked and open, though not large. The vomers do not appear in the palate. The feet are well webbed. The dorsal bony scutes are not articulated together; and there are no ventral scutes.

This genus contains only one species, the well-known *Alligator Mississippiensis*, or *lucius*, which is exclusively North American.

Cuvier (Oss. Foss. ed. 4. vol. ix. p. 211) gives the appearance of the vomer in the palate as a general character of the *Alligatores*; but this bone is not visible in the palate of any of those *Alligatores* which Cuvier would have referred to his *A. lucius* or *A. palpebrosus*, and which form the genera *Alligator* and *Caiman* as here defined. The vomers are in fact as slender and delicate as in the Crocodile, and extend only between the level of the tenth maxillary tooth anteriorly and the descending processes of the prefrontal posteriorly.

What may be called the median nares, or the arch formed by the postero-lateral part of the vomer and the anterior and superior lamina of the palatine bone on each side (which would constitute the posterior boundary of the posterior nares, if the palatine and pterygoid bones gave off no inferior or palatine processes), are situated nearly on a level with the twelfth tooth, or with the palato-maxillary suture.

Genus 2. CAIMAN.

Dental formula $\frac{20-20}{22-22}$ (Natterer). The face is without median or transverse ridges, but it is sharply angulated along a line which extends from the orbit forwards along the sides of the snout. The anterior nasal aperture is undivided in the dry skull. The vomers do not appear in the palate. The supra-temporal fossæ are obliterated, the circumjacent bones uniting over them. The webs of the feet are rudimentary. The dorsal scutes are articulated together by lateral sutures and anterior and posterior facets; and there is a ventral shield, consisting of similarly articulated scutes.

Natterer* has described three species of *Caiman*—*C. palpebrosus*, *C. trigonatus*, and *C. gibbiceps*. The Caimans abound chiefly in tropical South America; but they are found as far north as Mexico, a specimen of *C. palpebrosus* in Dr. Grant's collection coming from that country.

Genus 8. JACARE.

The snout is broad, and rounded at the end†. Each prefrontal bone is traversed close to its anterior extremity by the ends of a strong transverse ridge, which then curve round and pass forwards on the lachrymal and maxillary bones, to subside opposite the ninth tooth. The anterior nasal aperture is not divided by bone. The vomers, separated by a longitudinal suture, appear in the palate between the premaxillaries and the palatine plates of the maxillaries. The temporal fossæ, though not large, are open. The webs of the feet are small. The dorsal scutes are articulated together, as in the preceding genus; and there are similarly-articulated ventral scutes. There are 18–20 teeth on each side, above and below; and the fourth tooth in the upper jaw is the largest. The mandibular symphysis extends back nearly to the fifth tooth.

In a skull of *Jacare (fissipes?)*, 19 inches long, in the British Museum, I find that part of the vomer which is visible in the palate to be a rhomboidal plate, somewhat truncated anteriorly, and rather more than $1\frac{1}{4}$ inch long and 1 inch wide. Its anterior end comes within $\frac{3}{8}$ ths of an inch of the posterior margin of the anterior palatal foramen. Its posterior margin reaches to the level of the eighth tooth. The visible portion of each vomer is only its anterior end, which forms a thick and solid wedge-shaped plate, broader in front than behind, and articulating by a rough anterior and outer face with the premaxilla, by an obliquely ridged posterior and outer face with the maxilla, and by its internal face with its fellow. Its upper, rounded surface projects but little into the nasal passage. $2\frac{1}{4}$ inches behind its anterior end, the posterior and upper extremity of the vomer passes into a thin and narrow plate of bone, whose plane is at first inclined at an angle of 45° to that of the anterior part of the bone, but gradually becomes vertical; as it does so it deepens, until, 8 inches behind

* "Beitrag zur näheren Kenntniss der Sudamerikanischen Alligatoren," 'Annalen des Wiener Mus.,' Band i.

† According to Natterer, the dental formula of *J. nigra* and *J. fissipes* is
 $\begin{array}{c} 18-18 \\ 18-18 \end{array}$ of *J. sclerops* $\begin{array}{c} 19-19 \\ 20-20 \end{array}$ of *J. vallifrons* and *J. punctulata* $\begin{array}{c} 20-20 \\ 18-18 \end{array}$.

the anterior extremity, the vomer is a thin vertical plate of bone, $\frac{5}{8}$ ths of an inch deep, which articulates below with the palatine plate of the maxilla, and, about 1 inch behind this, with the palatine plate of the palatine bone. The upper edge of this plate nowhere extends to one-third of the height of the nasal chamber. It gives off a horizontal process outwards, which, gradually increasing in width, inclines downwards until it comes into contact, first, with the inner surface of the maxilla, and, $\frac{3}{4}$ ths of an inch behind this, with the nasal plate of the palatine bone. In front of its junction with the maxilla, the horizontal plate of the vomer presents a long free edge, concave externally; and this bounds the median nares internally and posteriorly. Throughout its junction with the maxilla, the horizontal plate is parallel-sided; but after it joins the palatine bone, it gradually narrows posteriorly, in consequence of the gradual increase in width of the palatine, and ends almost in a point, $6\frac{1}{2}$ inches behind its anterior end. The posterior edge of the vertical plate is extremely thin, and $\frac{7}{8}$ ths of an inch deep. It articulates with the anterior end of the vertical plate of the pterygoid, while the straight inferior edge articulates throughout with the palatine plate of the palatine bone. The vomers terminate midway between the median nares and the descending process of the prefrontal. The median nares are bounded entirely by the vomer and the maxilla. They correspond with the nasal face of the palato-maxillary suture, but are rather behind its palatine face, and they are about on a level with the interval between the tenth and eleventh teeth. If the anterior edge of the palatine bone bounded them, they would be a little behind the twelfth tooth. The posterior nares, $2\frac{1}{8}$ inches wide, by $\frac{7}{8}$ ths of an inch long, look altogether downwards, are completely divided by a bony septum, and have the form of a rhomboid with its narrowest side posterior. They are surrounded by a strong raised ridge, incomplete only at the anterior and outer angles of the rhomboid.

Five species of *Jacare* are enumerated by Natterer—*J. fissipes*, *J. sclerops*, *J. nigra*, *J. punctulata*, and *J. vallifrons*. They have met with only in South America.

II. In the family of the CROCODYLIDÆ the teeth are usually strong and very unequal in size, and there is always a considerable difference between the anterior and the posterior teeth. The two anterior mandibular teeth are received into pits in the premaxilla; but the canines pass into grooves (which may be converted into fossæ) situated at the junction of the premaxilla and maxilla.

The other mandibular teeth are received between the maxillary teeth. The symphysis of the lower jaw does not extend beyond the level of the seventh or the eighth mandibular tooth. The premaxillo-maxillary suture may be either straight or strongly convex backwards. The divided vomers do not appear in the palate. The posterior nares look more or less backwards, and are transversely elongated. The supra-temporal fossæ are always open, and the feet are distinctly webbed. The dorsal scutes are not articulated; and there are no ventral scutes.

Two genera, *Crocodylus* and *Mecistops*, are distinguishable in this family.

Genus 4. CROCODYLUS.

The teeth are always strong and very unequal, the strongest in the upper jaw being the tenth. The mandibular symphysis does not extend beyond the level of the sixth tooth. There are usually six cervical scutes, in two rows, or forming a rhomb, and separated by a distinct interval from the tergal scutes. There are 18 or 19 teeth above, and 15 below, on each side.

1. *Crocodylus vulgaris*.

As Cuvier has remarked, it is extremely difficult to find good distinctive characters for all the species of this genus. My first difficulty was to ascertain the precise characters of that species which has been misnamed *vulgaris*, inasmuch as I could find neither in the British Museum, nor in the Museum of the Royal College of Surgeons, any *authentic* skeleton or skull of this, the so-called Nilotic Crocodile. This difficulty subsisted up to the time that the chief statements contained in the present essay were laid before the Linnean Society; but since then I have been enabled, by Dr. Gray's permission, to examine the skull of a small stuffed specimen, brought to this country from Egypt by Sir Gardner Wilkinson, and to study the splendid entire skeleton of a *Crocodylus vulgaris* in the Christchurch Museum at Oxford, presented to that Institution by the gentlemen who shot it on the Nile, and set up with great care under the auspices of my friend Dr. Rolleston, Lee's Reader in Anatomy and Curator of the Museum. Fortunately the entire skin has been preserved; so that this is the most complete record of the hard parts of any individual crocodile with which I am acquainted, besides being, so far as I am aware, the only authentic entire skeleton of *Crocodylus vulgaris* in this

country. I subjoin the chief points of interest which I noted in my brief examination of this valuable specimen :—

	Inches.
The total length of the skeleton is	114
" " " skull	16
Between the outer edges of the posterior ends of the quadrate bones	8 $\frac{1}{4}$
From the snout to the middle of the canine notch...	2 $\frac{1}{2}$
Transverse diameter of snout opposite 10th tooth...	4 $\frac{1}{2}$
Long axis of orbit.....	2 $\frac{1}{4}$
Short axis of orbit.....	1 $\frac{5}{8}$
Interorbital space opposite the middle of the orbit	1 $\frac{1}{2}$
Anterior edge of the orbit from end of snout	10 $\frac{1}{2}$
Sincipital* area in length, about	2 $\frac{1}{2}$
" " in breadth anteriorly	3 $\frac{1}{4}$
" " " posteriorly	4
Supra-temporal fossæ, wide	7
" " long	1 $\frac{1}{8}$
Least width of parietal	1 $\frac{7}{16}$
Total length of mandible	20 $\frac{1}{2}$
Its greatest depth	3
Length of cervical region (or anterior 8 vertebræ)...	10 $\frac{1}{2}$
" dorso-lumbar region	27
" sacral " 	3 $\frac{1}{4}$
Length of humerus	7 $\frac{1}{4}$
" ulna	5 $\frac{1}{4}$
" fore foot, extreme length	6
" femur	8 $\frac{1}{4}$
" tibia	6
" hind foot, extreme length	9 $\frac{1}{4}$

From the above measurements it will be seen that the skull is somewhat slender. Behind the canine groove it widens to the tenth tooth, which is 5 $\frac{1}{4}$ inches behind the end of the snout. It retains about the same diameter to the twelfth tooth, and then slowly widens again,—a sudden increase in size, to the extent of half-an-inch, taking place opposite the posterior margin of the orbit, owing to the flanging-out of the jugal. On the whole, however, there is a slow and even increase in breadth, from the

* By this term I denote that squarish flat area bounded by the postfrontal and squamosal bones laterally, by the occiput posteriorly, and by a line joining the outer angles of the postfrontals anteriorly.

canine groove to the ends of the *ossa quadrata*. The nasal aperture is pyriform, its wider end being forwards, and its narrow posterior extremity, into which the pointed ends of the nasal bones project, attaining the level of the first tooth behind the canine groove.

On the left side there is only a pit for the reception of the anterior mandibular tooth, while on the right side this pit is converted into a complete foramen. On the upper face of the skull, the premaxillo-maxillary suture runs vertically upwards through the canine groove, and then passes obliquely backwards to a point 5 inches behind the end of the snout. The anterior part of this suture lies in a strong ridge, which is continued downwards and forwards on the premaxilla to the level of the fifth tooth, a groove separating it from the margin of the nasal aperture. Posteriorly this ridge dies away, but a curved irregular elevation, convex inwards, arises opposite the tenth tooth. It is wholly confined to the maxilla, not extending on to the nasals.

There is a distinct, rough, irregular elevation, bounded on its outer side by a sharp groove, which extends back to the orbit, on the lachrymal bone. The profile of the skull is convex as far as the posterior boundary of the nostril, and very slightly concave from that point as far as the twelfth tooth. It then passes back as a straight, slightly ascending line, only interrupted by the lachrymal ridge, to the margin of the occiput. The inferior margin of the maxilla is convex downwards as far as the canine groove, whose lower end is indicated by a deep sinuation. It then becomes convex again, the crown of the curve being at the ninth and tenth teeth, and its posterior end sweeping into a concavity whose summit is at the twelfth tooth. Behind this the edge of the maxilla is only slightly convex. The inferior contour of the jugal bone is very concave; but the articular end of the quadrate bone descends to the level of the edge of the ninth alveolus.

The orbits have a sort of heart-shape, their apices being turned forwards, and their more convex sides inwards.

The supra-temporal fossæ are half-moon-shaped, their straight sides being external and so inclined that, if prolonged, they would decussate upon a line joining the anterior margins of the orbits.

On the palatine surface of the skull, the premaxillo-maxillary suture runs backwards from the canine groove, as far as the level of the middle of the second alveolus behind the groove (or that of the seventh tooth), which point it reaches at about the junction of the middle with the inner third of the palatine plate of the

maxilla. The suture then turns abruptly forwards until it reaches the level of the anterior margin of the alveolus of the sixth tooth, when it bends suddenly inwards to meet its fellow. The whole suture, therefore, has the form of a W. The vomers are completely hidden.

The posterior nares look downwards and backwards; their aperture is, from the incompleteness of the septum, single, and has a transversely elongated crescentic form. It measures $1\frac{1}{2}$ inch in width by $\frac{1}{2}$ ths antero-posteriorly. The basi-sphenoid is seen for about $\frac{1}{4}$ th of an inch on the base of the skull behind it, bounding the sides of the eustachian tube. The dental formula is $\frac{18-18}{15-15}$.

The fourth and tenth teeth are largest in the upper jaw, the first and fourth in the lower. The eight posterior teeth on each side in the upper jaw, and the five posterior in the lower, have a marked constriction between the short crown and the fang of the tooth. There are deep interdental pits for the reception of the mandibular teeth between the third and fourth, and fourth and fifth teeth above, and between the succeeding teeth from the sixth to the thirteenth.

The hyoidean cornua are very strong curved bones, the chord of whose arc measures $3\frac{1}{2}$ inches. They are concave inwards, convex outwards, concave posteriorly, convex anteriorly; they are flattened from side to side below, but they end above in subcylindrical styloid extremities.

In the ninth vertebra the neurocentral suture passes just above the base of the parapophysis; it traverses the parapophysis in the tenth and eleventh vertebræ, while in the twelfth the parapophysis suddenly rises to the root of the diapophysis, and the suture lies far below it. The centra of the dorsal vertebræ, as far as the thirteenth inclusive, have hypapophyses. The diapophyses of the ninth vertebra pass almost horizontally outwards, but are a good deal inclined backwards. In the succeeding vertebræ up to the fourteenth or fifteenth, the diapophyses are, in addition, inclined upwards, the upward inclination being most marked in the tenth, eleventh and twelfth vertebræ. From the fifteenth vertebra onwards, the transverse processes pass almost directly outwards, without either upward or backward inclination. The span of the transverse processes is greatest in the eighteenth and nineteenth vertebræ, in which the distance between the extremities of these processes is $7\frac{1}{2}$ inches, a length about equal to that of the longest vertebral rib.

The rib of the ninth vertebra is terminated by a single long and slender semicartilaginous process which does not unite with the

sternum. Each of the vertebral ribs from the tenth to the seventeenth vertebræ inclusively, on the other hand, is united with the sternum, or its continuation, by two such semicartilaginous costal elements, which may be respectively termed sternal and lateral. The sternal elements of the ribs of the tenth and eleventh vertebræ are united with the sternum proper; those of the next five vertebræ are connected with its median backward prolongation, while those of the seventeenth vertebra are attached to the processes into which this prolongation divides posteriorly.

The sternal costal elements are very broad and flat, and though the lateral ones are less so, they are wide and expanded. The lateral costal pieces of the eleventh to the sixteenth vertebræ inclusively, give attachment to very large and flat, triangular, *processus uncinati*. Those of the twelfth are $3\frac{1}{4}$ inches long and $1\frac{1}{8}$ inch wide at their widest part. The transverse processes of the twentieth vertebra bear rudimentary ribs. The centrum of the thirteenth vertebra is $1\frac{1}{4}$ inch long, and the vertebra is $3\frac{1}{4}$ inches high from the lower edge of the centrum to the summit of the neural spine. The centra of the vertebræ retain nearly the same length to the twentieth caudal; but behind this vertebra they are shorter, as are the anterior dorsal vertebræ. The first caudal vertebra is provided with two styliform bones, which represent the chevron bones of the other caudal vertebræ, but are not united below.

The dorsal scutes have the arrangement which has often been described. They are separated (except perhaps the median rows) by integumentary spaces, neither overlapping nor uniting by sutures; and there are no ventral scutes.

Among the osteological characters which have been detailed, the peculiarities of the tergal armour, the proportions of the skull, combined with the characters of the ridges upon its surface, and the form of the premaxillo-maxillary suture amply suffice to diagnose this species. Even in the small skull, only $5\frac{1}{4}$ inches long, lent to me by Dr. Gray, the characteristic features of the species are well exhibited, although age appears to give rise to many differences. Thus the posterior margin of the external nostrils does not extend so far back as in the adult, and the facial is smaller in proportion to the syncipital region, whose anterior and posterior transverse dimensions are very nearly equal. The orbits are proportionally larger, the interorbital space more excavated; and the outer straight margins of the supratemporal fossæ are parallel with the longitudinal axis of the skull. Still more important differences

are visible on the palatine face of the skull. The premaxillo-maxillary suture reaches back, indeed, to the line of the seventh tooth; but it forms an even curve whose summit is in the middle line. The aperture of the posterior nares, again, has a totally different form from that which it assumes in the adult. It is somewhat heart-shaped, with its apex forwards, measures $\frac{1}{4}$ inch long by $\frac{3}{8}$ ths at broadest, and looks altogether downwards, while its anterior margin is situated far more forward in the palate than that of the adult.

2. *Crocodilus biporcatus*.

This, the best-known Crocodile, is a very well-marked species, characterized (beside the peculiarities of its dermal armour) by a comparatively slender skull, similar in shape to that of *C. vulgaris*, and, like it, without any sudden enlargement immediately behind the canine groove; and by the strong ridge which arises on each lachrymal bone close to the anterior edge of the orbit, and is continued forwards on to the line of junction of the nasal and maxillary bones, so that the naso-maxillary suture traverses the axis of the ridge, and then curves outwards, descending towards the alveolus of the tenth tooth. The premaxillo-maxillary suture is W-shaped; and its salient angles reach backwards even to the level of the posterior margin of the seventh alveolus.

3. *Crocodilus Americanus* (*acutus*, Cuv.)

has the slenderness of snout (even more marked) and the form of the premaxillo-maxillary suture of the preceding species; but it is at once distinguished from this and all other Crocodiles (except *C. rhombifer*) by the marked longitudinal and transverse convexity of the middle of the face, which gives the profile a totally different aspect from that of the other species, which are flat or concave in this region.

4. *Crocodilus Journei*

is another unmistakeably distinct and very remarkable species. The descriptions and figures given by Graves, Bory de St. Vincent, and Duméril and Bibron, of the unique specimen of this Crocodile in the Bordeaux Museum, would alone have compelled me to differ entirely from the view taken by Dr. Gray of the affinities of this species. These observers agree in stating that *Crocodilus Journei* has six cervical scutes, arranged as in the other Crocodiles, and, as Graves says, "separated by an interval of four inches" from the commencement of the tergal scutes, whence it is obviously impos-

sible that it can be a *Mecistops*. But, in addition to this, I had the good fortune to find, among the recent additions to that excellent osteological collection which Dr. Gray has gradually formed at the British Museum, the skull of a Crocodile obtained from a dealer in Paris, and labelled by him "Croc. de l'Orinoko." I at first imagined this Crocodile to be a *Mecistops*; but on careful investigation it turned out to be no other than the skull of a *Crocodilus Journei*, somewhat larger than the Bordeaux specimen, but, as the subjoined measurements will prove, agreeing with it in all its proportions:—

	Inches.
Length from end of snout to end of ossa quadrata...	22½
Breadth between outer margins of ossa quadrata ...	9½
—— at the level of the anterior margins of the orbits	5½
—— at the tenth tooth	3½
—— at the end of the snout	2½
—— of the interorbital space	1½
Length of mandibular symphysis	5

Now Duméril and Bibron expressly state that the length of the head of *C. Journei* equals $2\frac{1}{2}$ times its greatest transverse diameter, that the width of the jaws at the anterior margins of the orbit equals one-fourth the length of the head, and that at the tenth tooth it equals one-sixth the length of the head; and these are as nearly as possible, it will be observed, the relations of the same dimensions in the above list.

In the specimen in the British Museum there are eighteen teeth on each side above, and fifteen below. The Bordeaux specimen is stated to have the same dental formula, except that there are sixteen teeth in the left ramus of the mandible. The fourth and tenth maxillary teeth are stated by Graves to be as large again as the others; and the corresponding alveoli have these proportions to one another in the British Museum specimen. In fact, there can be no doubt that this skull is that of a true *Orocodilus Journei*.

But its general characters at once prove the close affinity of *O. Journei* with the other true Crocodiles, from which it differs only in its elongated and gradually tapering skull, and in the more backward extension of the mandibular symphysis*, which attains the level of the posterior margin of the sixth tooth.

In this character, and in the extreme slenderness of the snout,

* The greater proportional length of the symphysis is noted by Duméril and Bibron.

there is doubtless an approximation to *Mecistops*; but *Crocodylus Journei* is sharply separated from that genus by the characters of its teeth, and by those of its dermal armour.

5. *Crocodylus bombifrons* (*palustris*?).

All the species of *Crocodylus* which I have hitherto mentioned have, in common, the backward curvature of the premaxillo-maxillary suture to the level of the seventh tooth. But there is a species of Crocodile, about whose proper specific name I am by no means clear, in which this suture passes straight across the palate, or may even be a little convex forwards.

And not only do the skulls of this species exhibit this approximation to those of the *Alligatoridae*, but they resemble them still further in their rounded snouts, their great width immediately behind the canine groove, and in the fact that, in young specimens, one or the other canine may be received into a pit instead of into a groove*.

In the Hunterian Collection there are seven skulls, varying in length from $5\frac{1}{4}$ inches up to 16 inches, in none of which does the crown of the premaxillo-maxillary suture extend beyond a line joining the sixth pair of teeth. In all there are two short ridges (convergent in young specimens, nearly parallel in old ones) upon the lachrymal bones, which end before reaching the anterior limits of those bones. They all have an oblique ridge on the upper jaw above the tenth tooth; and the snout attains the width which it has opposite this tooth immediately behind the canine groove. In the British Museum there are five middle-sized skulls with the same characters; but two of these have a pit on one side of the upper jaw, and a groove on the other, and one has something between a pit and a groove on each side.

Dr. Gray, has in his 'Catalogue†,' mentioned the peculiar transverse disposition of the premaxillo-maxillary suture in his *Croco-*

* In a skull of this species $14\frac{1}{4}$ inches long, in the British Museum, the vomers are completely excluded from the palate, and their anterior ends do not extend for an eighth of an inch beyond the palatine part of the palato-maxillary suture, which lies on a level with the anterior margin of the twelfth alveolus. Each vomer is $2\frac{1}{4}$ inches long, and presents the same general form as that of *Jacare*; only the anterior division is but a very small, flat and thin plate, not a quarter of an inch long. The boundary of the median nares is formed in equal proportions by the vomer and the palatine, and is opposite the fourteenth tooth. The hinder end of the vomer articulates with the end of the descending process of the prefrontal.

† 'Catalogue of the Tortoises, Crocodiles, and Amphibians in the Collection of the British Museum,' 1844, p. 59.

dilus bombifrons; and on examining the two crania thus named in the British Museum collection, one of which is 20 and the other 21 inches long, I can discover no distinguishing character between them and those already described. There can be no doubt then, I think, that these constant and well-marked characters, exhibited by fourteen skulls which vary in length from 5½ to 21 inches, prove the existence of a distinct species of Crocodile, which I would provisionally term *bombifrons*.

I believe that this species has been constantly confounded with *biporcatus*, from which it may be at once distinguished by the direction of the premaxillo-maxillary suture, and by the shape of the snout behind the canine groove. I have found these distinctions to hold good at all ages; but the last-mentioned difference is far more marked in middle-aged than in either young or old specimens.

All the skulls named *Crocodilus palustris* which I have seen are referable either to *C. biporcatus* or to *C. bombifrons*. With respect to the *C. palustris* of Lesson and Duméril and Bibron, the latter authors consider it to be only a variety of *C. vulgaris*. Their description would, however, apply very well to *C. bombifrons*, as I have defined it above; and they expressly state ('Erp. Générale,' t. iii. p. 118) that all their specimens (twelve in number and varying in length from 30 centimetres to more than 8 metres) came from the East Indies or the Seychelle Islands. Now, Duméril and Bibron enumerate only three Asiatic Crocodiles—*C. biporcatus*, *C. palustris*, and *C. galeatus*, the last of which was only known to them by description; so that all the numerous Asiatic crocodiles which passed through their hands belonged either to *C. biporcatus* or *C. palustris*. On the other hand, all the skulls of crocodiles from Asia which I have met with (amounting to at least twenty) are either those of *C. biporcatus* or of the species which I have called *bombifrons*; so that I suspect the latter title will turn out to be a synonym of *palustris*.

6. *Crocodilus rhombifer*.

I have not been able to obtain any skull of this species, which, according to Cuvier's account and figures ('Oss. Fossiles,' t. ix. p. 102), resembles *C. Americanus* in the great convexity of its nasal region, but differs from it in the greater breadth of the skull, and in the strong converging preorbital ridges, which appear to be limited to the lachrymal bones. If the figures are to be trusted, however, there are other very important distinctive characters

about the cranium of this species; for Cuvier's, fig. 2, pl. 331, which gives a view of the palate, shows the premaxillo-maxillary suture forming a nearly straight transverse line.

There remain several species of *Crocodilus* whose skulls I have not been able to examine, and of which no sufficient descriptions exist. Of these, (7.) *C. galeatus* and (8.) *C. Gravesii* (*planirostris*) would appear to be very distinct forms. (9.) *C. marginatus* is considered by Duméril and Bibron to be only a variety of *C. vulgaris*; and they take the same view of (10.) *Crocodilus suchus*. Professor Owen, however, has figured the cranium of an Egyptian mummy under this name ('Monograph on the Reptilia of the London Clay,' Pal. Soc., 1850). In the under-view of this skull (tab. i. fig. 2), the junction of the premaxilla and the maxilla in the palate seems to be broken away; but on the left side, the palatine process of the maxilla is entire, as far as the level of the anterior margin of the sixth tooth, and there is not a trace of a suture behind this point. Are there, then, two or more species of Crocodile in Egypt, as Geoffroy St.-Hilaire supposed?

With regard to the distribution of the species of *Crocodilus*, *C. vulgaris*, *C. marginatus*, and *C. suchus* (?) appear to be exclusively African; all the crocodiles from other parts of the Eastern hemisphere, which I have met with, belong, as I have stated above, either to *C. biporcatus* or *C. bombifrons*, both of which species are found in the Ganges. *Crocodilus galeatus* appears to be peculiar to Siam. *Crocodilus Americanus* and *C. rhombifer* are undoubtedly American. *C. Journei* has been supposed to be African; but such positive evidence as exists tends rather to prove it to be an American species. Thus Bory de St. Vincent states that the Bordeaux specimen is "suspected to have come from America;" and, as I have said, the skull in the British Museum is labelled "from the Orinoko."

Crocodilus Gravesii (*planirostris*) is supposed by Bory de St. Vincent to have been brought from the Congo; but its real origin is not known.

Genus 5. MECISTOPS.

The cranium is elongated, and the snout slender and Gavial-like. There are eighteen slender and subequal teeth above, and fifteen below, on each side. The mandibular symphysis extends back to the level of the seventh tooth. The cervical scutes are arranged in two transverse rows, each of which contains two scutes; and there is no space left between the posterior row and the tergal series.

This excellent genus, as established by Dr. Gray, includes Cuvier's *Crocodilus cataphractus* (which Dr. Gray considers to be the young of a species whose full-grown form was discovered by Mr. Bennett in West Africa), *Crocodilus Journei* and *Crocodilus Schlegelii*. As I have endeavoured to show, however, *C. Journei* is a true crocodile; and, as I shall point out below, Müller and Schlegel have satisfactorily proved *C. Schlegelii* to be a Gavial. Consequently *Mecistops* is at present represented by only one species, which must be called *M. cataphractus* if *M. Bennettii* of Gray is really the adult of the form which Cuvier described.

III. In the family of the GAVIALIDÆ, the snout is always very long and slender; the teeth are for the most part slender, sharp-edged, and subequal. The two anterior mandibular teeth pass into grooves, one of which lies on each side of a beak-like prominence of the premaxillæ, which carries the two anterior upper teeth. The canines are received into grooves. The mandibular symphysis extends back to at least the fourteenth tooth, and is partly formed by the junction of the splenial bones. The premaxillo-maxillary suture is always strongly convex backwards. The posterior nares are situated more forward than in the *Crocodili*. The temporal fossæ are large. The feet are strongly webbed. The dorsal scutes are not articulated; and there are no ventral scutes.

I distinguish two genera in this family, *Rhynchosuchus* and *Gavialis*.

Genus 6. RHYNCHOSUCHUS.

There are twenty teeth above, and eighteen or nineteen below, on each side; the mandibular symphysis extends to the fifteenth tooth. The posterior teeth of the upper jaw, and almost all those of the lower jaw, are received into interdental pits; the orbital margins are not raised; and the premaxillæ are hardly at all expanded. The premaxillo-maxillary suture does not reach the third tooth behind the notch.

I propose the name *Rhynchosuchus* to indicate that generic type which is at present represented by the solitary species called by Müller and Schlegel *Crocodilus* (*Gavialis*) *Schlegelii*, and admirably described and figured by them in their essay, 'Over de Krokodilen van der Indischen Archipel,' in the 'Verhandelingen over de natuurlijke Gesch. der Nederl. overzee. Bezittingen,' 1839-1844. Under the title *Crocodilus* (*Gavialis*) *Schlegelii* (p. 18), they say—"The Gavial from Borneo, when compared with

the Indian one, is principally distinguished by the following characters:—

- " 1. By its stronger form and better developed limbs.
- " 2. By its much less slender head and snout, which last does not narrow so suddenly in front of the eyes as in *G. Gangeticus*.
- " 3. By the smaller number of teeth, of which there are twenty above and eighteen below on each side, while *G. Gangeticus* has $\frac{20}{20}$ or $\frac{27}{25}$; furthermore, the teeth are stouter, less curved, and less sharp, and are disposed more perpendicularly, and the ninth tooth of the upper jaw (reckoning from the front) is considerably larger and stronger than the others; whence it follows that, just as in the true Crocodiles, the snout at the level of this tooth exhibits a lateral projection.
- " 4. By the shorter symphysis of the under jaw.
- " 5. By the absence of the swollen nasal prominence (neus-kelep), which characterizes the Gangetic Gavial.
- " 6. By the less expanded form of the tabular upper surface of the hinder part of the skull.
- " 7. By the very slight production of the edges of the orbit.
- " 8. By the large eyes.
- " 9. By the presence of a number of small nuchal shields, while *G. Gangeticus* has but one pair.
- " 10. By the strongly developed keels of the dorsal scutes.
- " 11. By the much larger scales on the under parts and on the legs of the animal.
- " 12. By the different colours with which it is variegated."

These authors further point out that the vomers appear for a small space in the posterior part of the palate, that the opercular or splenial bones join in the symphysis of the lower jaw, and that the cervical and dorsal scutes form one continuous shield; and they represent the two anterior mandibular teeth passing in grooves on either side of the end of the premaxilla. In fact, they fully and completely establish the fact that their new species belongs to the *Longirostres* of Cuvier, or to the Gavials of later writers.

Under these circumstances, it is somewhat surprising to find the deliberate conclusions of these careful investigators set aside in the following brief passage:—

" This Bornean species (*C. Schlegelii*) was, in fact, originally described as a new species of Gavial; but the nasal bones, as in the fossil from Sheppey, figured in t. ii. 15, extend to the hinder

border of the external nostril."—Owen, *Fossil Reptilia of the London Clay, Crocodilia*, p. 15: 1850.

Müller and Schlegel give remarkably clear and beautiful figures of the skull of their Gavial; and these show at once that the nasal bones do not "reach the hinder border of the external nostril," but meet the premaxillaries at a point very distant from that border, viz. opposite the ninth tooth. Even did the nasal bones reach the posterior boundary of the nostril, such a character would not outweigh those derived from the relations and number of the teeth, the structure and extent of the mandibular symphysis, and the disposition of the dermal scutes,—all of which are so clearly and definitely set forth by Müller and Schlegel, that it seems difficult to understand how any one who had consulted the original memoir could have overlooked them.

It was possible, however, that Müller and Schlegel, notwithstanding their great opportunities, might have erred in their statements; and I therefore gladly seized the opportunity of testing their description by comparing it with an authentic skull of the species in question, from New Guinea, in the collection of the British Museum.

I have found the statement of Müller and Schlegel minutely accurate in almost all points; and there cannot be the slightest doubt, not only that the Schlegelian crocodile is one of the *Gavialidae*, but that it forms a distinct generic type in that family, as different from *Gavialis* as *Caiman* is from *Jacare*, or *Mecistops* from *Crocodilus*.

The following are the most important measurements of the skull of *Rhynchosuchus Schlegelii* in the British Museum collection:—

	Inches.
Length from the end of the premaxilla to that of os quadratum.....	23
Breadth from outer edge of one os quadratum to that of the other	8½
Breadth across the face in front of the orbits	4
„ at the 9th tooth	2
„ at the 5th tooth	1½
„ at the 3rd tooth	1¼
„ of the beak-like curved process which carries the two anterior teeth	1
Mean width of lower jaw from symphysis to ex- tremity	1½

	Inches.
Length	12
No tooth measures transversely more than	$1\frac{5}{8}$

The face is very smooth; but a slight longitudinal groove runs down on each side from the anterior margin of the orbit for about two inches. Anteriorly to this point the snout retains a nearly even diameter as far as the ninth tooth, in front of which it suddenly narrows a little, retaining nearly the same dimensions to the fourth tooth, where it widens a very little, and then suddenly narrows to the terminal beak. The lower jaw does not expand at all at its extremity. The nasals join the premaxillaries opposite the ninth tooth, and the splenial bones, in the lower jaw, end opposite the tenth mandibular tooth, as the figures of Müller and Schlegel show. The vomers appear between the inner edges of the palatines posteriorly, as a thin bony band $1\frac{1}{2}$ inch long by $\frac{1}{8}$ inch wide, which tapers at each end and is divided by a longitudinal suture. The ninth tooth of the upper jaw is stronger than the rest.

The only point in which the description of Müller and Schlegel seems to me to be incomplete* is with regard to the disposition of the teeth. They say—"The teeth of *C. Schlegelii*, as regards their form and development, more nearly resemble those of the true Crocodiles; but in the way in which the teeth of the two jaws are opposed, there is the most complete resemblance between our species and the Gangetic Gavial,—both which species differ from all other crocodiles in the circumstance that when the mouth is shut, all the teeth of the under jaw project outside the lateral margin of the upper jaw" (*l. c.* p. 22).

What I find is this:—The anterior teeth of both the upper jaw and the mandible are long, slender, sharp-edged, and slightly curved. The posterior eleven, on each side, in the upper jaw, are short, straight, conical, and constricted below their crowns. There are deep interdental pits between the ten posterior mandibular teeth, into which the opposed teeth of the maxilla are received when the jaws are closed. All the mandibular teeth, except the two anterior and the fourth pair, pass into like pits in the upper jaw. The anterior eight teeth on each side of the upper jaw pass straight down outside the lower jaw. In the Gangetic Gavial the relations of the teeth of the two jaws appear to me, as I shall state below, to be very different.

* Or it is possible that the *Rhynchosuchus* from New Guinea, which I have examined, is specifically distinct from the Bornean form.

Rhynchosuchus Schlegelii inhabits the inland lakes of Borneo, and is found in New Guinea.

Genus 7. *GAVIALIS*.

There are twenty-seven or twenty-eight teeth in the upper, and twenty-five or twenty-six in the lower jaw. The mandibular symphysis extends to the twenty-third or twenty-fourth tooth. The lateral teeth of both jaws are, all but the very hindmost, directed obliquely downwards (or upwards), forwards or outwards, and are not received into interdental pits. The anterior margins of the orbits are raised. The premaxillæ and the end of the mandible are greatly expanded. The premaxillo-maxillary suture reaches the level of the fourth tooth behind the canine notch.

The only true *Gavialis* is the well-known *G. Gangeticus* from the East Indies. In this 'Gavial,' or 'Garrhial,' the vomers are slender bones which do not extend further forwards than the level of the twenty-second or twenty-first tooth, and have but a very short and slender representative of the anterior flattened division of the bone in *Jacare*; posteriorly they extend back to the level of the descending processes of the prefrontals. In a skull 25 inches long the vomers have a length of about 4 inches, extending as they do a little further forward than the palato-maxillary suture. The median nares are opposite the twenty-fifth tooth.

All the *Crocodylia* which I have enumerated are provided with two perfectly distinct kinds of dermal armour,—the one consisting of plates of horn, produced by a modification of the superficial layer of the epidermis; the other composed of discs of bone marked by a peculiar pitted sculpture on their outer surfaces, and developed within the substance of the dermis. To the former I shall apply the term "scales;" the latter are what I have denominated "scutes."

All recent *Crocodylia* have both scales and scutes in the dorsal region of the body, the scutes underlying, and having the same general form as, the scales. In all, the ventral region of the body is also covered with scales which have a very definite shape; but in no recent Crocodylian which I have examined, save those species which are included in the genera *Caiman* and *Jacare*, are there any scutes in the ventral region.

Again, in the genera *Alligator*, *Crocodylus*, *Mecistops*, *Rhynchosuchus*, and *Gavialis*, the edges of the scutes, except those of the two median longitudinal rows, are hardly ever united by sutures,

nor do the posterior margins of those in each transverse row overlap the anterior margins of the succeeding row. At any rate, there is no flat, bevelled, articular facet on the outer surface of the anterior margin of a scute, for articulation with the inner surface of the posterior margin of its predecessor. In the genera *Caiman* and *Jacare*, however, the lateral edges of all the scutes of the dorsal and ventral shields are united by serrated sutures; and the anterior end of the outer face of each is provided with a well-marked smooth facet, which is overlapped by the smooth under-surface of the scute in front of it.

I first noticed the remarkable structure of the dermal armour of these *Alligatoridae* in the skin of a *Jacare* (*sp. incerta*), wanting the end of the tail, but which must have belonged to an animal between five and six feet in length. It had long been in my possession; but I had never before had occasion to study its characters minutely.

The horny scales, which had the appearance of thin tortoise-shell, could be readily peeled off (especially by the aid of a little caustic potash); and then the white surface of the subjacent bony scute upon which they were modelled came into view. It is to be understood, however, that the inner surface of the scale corresponded only in its general form with the outer surface of the scute; for it did not dip into the pits with which the latter is sculptured. These are in fact filled by the dry dermis which extends over and encloses the scute, a very thin layer (bearing the rete mucosum) being interposed between it and the scale; so that the pitted sculpture does not come out well until the scutes have been boiled.

The *dorsal* scutes are both carinated and angulated. By the application of the former term, I mean to indicate that, along a median or submedian longitudinal line, their substance is more or less elevated, so as, in many cases, to form a very prominent crest. This crest always subsides before it reaches the anterior margin of the scute, though it may extend beyond the posterior margin. Its highest point is always behind the centre of the scute, and is devoid of sculpture. The sculpture however seems to radiate from this point, inasmuch as it consists, on the greater part of the scute, of distinct pits, which are usually round towards the centre, but towards the periphery become ovals with their long axes directed towards the point in question.

The smooth inner surfaces of the scute shelve towards a depression which corresponds with the external ridge, under which the

sides of the scute seem to meet in an angle. This may be called the 'angulation' of the scute. From before backwards, the inner surface of the scute is a little convex. The scute is thickest in the middle; posteriorly, it thins off to an edge and overlaps its successor; anteriorly, its outer surface is bevelled off at an acute angle with the inner, so as to give rise to a smooth shelving surface—wide from side to side, narrow from before backwards—forming the 'articular facet,' which is overlapped by the inner surface of the posterior edge of the preceding scute. I have termed this the 'articular facet;' but it must not be supposed that there is anything like a true joint between the opposed facets of the overlapping and overlapped scutes; on the contrary, they are at once separated and connected by the dermal connective tissue.

The posterior margin of the articular facet is separated by a deep transverse groove, divided by little partitions into as many pits, from the rest of the sculptured surface; but there is no trace of any suture dividing the scute into two portions. The lateral margins of each scute are united by serrated sutural edges with those which lie next to them in the same transverse row; so that each row forms a nearly solid flat bony bar, composed, in the middle of the back, of as many as ten distinct scutes. The outer edges of the outermost scutes only, thin off and exhibit no sutural serration, inasmuch as they are not directly connected with any other scutes.

The median line of the back corresponds in general with the suture between the two middle scutes of each transverse row; so that the scutes are disposed symmetrically on either side of that line. Furthermore, the anterior part of the inner surface of each of the two middle scutes is connected by ligament with the extremity of the spinous process of a vertebra; at least, this is the case in the dorsal, lumbar, sacral, and anterior caudal regions.

The scutes which protect the *ventral* side of the body, from the throat backwards, are four-sided and similar in their ornamentation to the dorsal scutes; but they exhibit neither ridge nor angulation, their outer and inner surfaces being parallel, and either nearly flat or evenly curved. Each forms, in fact, a segment of a large cylinder, inasmuch as the whole ventral shield is convex transversely, being nearly flat in the middle and much bent up at the sides. The dorsal shield, taken as a whole, is, on the contrary, nearly flat. The lateral edges of the ventral scutes interlock suturally; and their anterior and posterior edges are overlapped and overlap, just like the dorsal scutes. The outer edges of the

outermost ventral scutes thin off and are not united with any bony element; and the ventral, like the dorsal scutes, are usually arranged symmetrically on either side of the median sutural line. There may be as many as twenty-two scutes united by their lateral sutures into a single strong, curved, transverse, bony, bar-like segment of the ventral armour.

Throughout the neck and body, and as far as the commencement of the tail, the ends of the dorsal and ventral bony bars, whose sum may be regarded as a dorsal and a ventral shield respectively, are separated by an interval of integument, in which only small scattered scutes are visible. The physiological import of this arrangement becomes obvious when we consider in what manner the animal breathes; and indeed the integumentary interval answers very precisely to the leather which connects the two boards of a bellows. Again, though the limbs are themselves covered with articulated scutes, they are afforded free play upon the body by this flexible interspace. Immediately behind the hind legs, the ventral and dorsal shields unite; and the tail is from that point surrounded by a succession of bony hoops, each of which corresponds with a vertebra, the segments of the exoskeleton answering to those of the endoskeleton.

The most remarkable feature about the ventral scutes, however, and that in which they differ most widely from the dorsal ones, consists in the fact that each scute is composed of two distinct pieces, an anterior and a posterior, which unite together by a transverse serrated suture. The anterior piece or 'semi-scute' may attain to three-quarters the length of the posterior, and it has exactly the same width. The anterior semi-scute bears the articular facet and the transverse pitted groove, whose posterior wall is just in front of its hinder edge, or in other words, of the suture, when the two semi-scutes are united.

Such are the general characters and mode of arrangement of the dorsal and ventral armour of *Jacare*. But there remain many noteworthy peculiarities in the disposition and number of the components of each band of the armour.

Thus, in the *dorsal shield* there are two rows of nuchal scutes, each containing eight separate keeled bony plates; and of cervical scutes there are five rows, the two anterior of which contain four angulated and carinated scutes each, while the three posterior contain only two scutes each. All these scutes, except the anterior row, have articular facets; and all those of each row are united suturally. Of dorsal scutes there are thirty transverse rows up to

the median keel of the tail, which commences with the thirty-first row. The number of scutes in each row is as follows :—

Rows.	Scutes.	Rows.	Scutes.
1, 2, 3, 4	6	25, 26	5
5, 6, 7, 8, 9, 10, 11	10	27, 28	4
12, 13	8	29, 30	4
14, 15	6		
16, 17, 18	4	31, 32, 33, 34	5
19	6	The rest of the tail is	
20	8	wanting.	
23, 24	6		

Throughout the dorso-lumbar and sacral regions (*i. e.* up to the nineteenth row), the median scutes are hardly keeled at all, while the outer ones are the more strongly carinate the more external they lie.

In the caudal region, the second scute from the middle line, in the twenty-third row, has a strong keel and angulation, which grows stronger in the corresponding scutes up to the thirtieth inclusive, until the superior and lateral faces of these scutes, in the twenty-ninth and thirtieth rows, are inclined to one another at a right angle and very strongly keeled. I have said that, as a rule, the median line is occupied by a suture between two median scutes ; but in the caudal region*, in the twenty-fifth row (which corresponds with the sixth caudal vertebra) the two median scutes are replaced by one flat scute, so that there is no suture in the middle line. In the twenty-sixth row there is a similar arrangement, but the flat scute is smaller ; and in the twenty-seventh no trace of it is left, so that the strongly keeled lateral scutes meet in the middle line, which is again occupied by a suture. This continues up to the thirty-first row, when the median scute reappears as a thin vertical plate, broader below and in front, where it articulates with the median lateral scutes, than above and behind, where it exhibits a free edge only covered by the horny epidermis. It is thus that the serrated dorsal crest of the tail is formed. The scutes of the crest exhibit only very small round and distant pits.

The *ventral shield* begins in the neck just behind the level of

* The second and third cervical rows in *Caiman palpebrosus* and *trigonatus* also contain a median scute, and consequently an odd number of scutes. In *Caiman trigonatus*, the third to the ninth supra-caudal rows have each a median single scute.

the anterior margins of the orbits: the fifteen anterior rows may be termed subcervical, as they lie in front of the thorax. In the first six rows the scutes are very small, and increase in number up to twelve in a row. In the next six rows there are ten scutes in a row, and in the last three, twelve. All these rows are symmetrically divided by the median line. In the three hinder rows the inner scutes are longer than the outer ones; and this is most markedly the case in the fifteenth row, whose innermost scute is half as long again as the corresponding one of the preceding row, and more than three times as long as the outermost of its own row.

The sixteenth row differs from its predecessors and successors, and may be termed the axillary row. It is bent upon itself with an angle open forwards, and is divided into two halves (each of which contains seven scutes) by the union of the middle scutes of the fifteenth subcervical with those of the first row of what may be termed the subdorsal scutes, or those which lie under the thorax and abdomen. Of subdorsal and subcaudal scutes there are, up to the broken-off end of the tail, thirty-seven rows, with the following numbers of scutes:—

Rows.	Scutes.	Rows.	Scutes.
1	12	22	18
2	10	23	22
3, 4, 5	12	24	22
6, 7, 8, 9	14	25	20
10	16	26—28	18
11	14	29—31	16
12—17	14	32—34	14
18—20	12	35	12
21	14	36, 37	10

It will be noticed that there are three more rows of ventral than of dorsal scutes. On endeavouring to ascertain how this came about, I observed that the first subdorsal was a good deal behind the first dorsal row, though the eighth to the twelfth dorsal corresponded exactly with the eighth to the twelfth ventral rows. In the anterior part of the body, therefore, there is a clear general correspondence between the segments of the dorsal and those of the ventral armour.

In the caudal region, again, I found that the twenty-fourth ventral row, which is the first of the caudal rows not excavated by the

vent, corresponded exactly with the twenty-first dorsal row. It was clear, therefore, that three ventral rows were interpolated somewhere between the twelfth and twenty-first dorsal rows; and on close examination I found this interpolation to arise from the doubling of the fourteenth, fifteenth, and sixteenth ventral rows.

I have examined *Jacare flaviges* and *nigra*, *Caiman trigonatus*, and *C. gibbiceps*, in the British Museum; and I find, in all, dorsal and ventral armour having the same essential arrangement as that just described. A specimen of *Caiman palpebrosus* about two feet long, the opportunity of examining which I owe to Dr. Grant, exhibits the dorsal and ventral shields (whose scutes are in the main similarly arranged) very beautifully; and a young *Jacare* of about 18 inches in length, for which I am indebted to the kindness of the same gentleman, proves that the scutes are developed even in specimens of this age. I have no hesitation therefore in expressing my belief that this singularly complete dermal armour will be found to be characteristic of all the species of the genera *Caiman* and *Jacare*. On the other hand, I have examined *Alligator Mississippiensis*, *Crocodylus vulgaris*, *C. biporcatus*, *C. Americanus*, *C. rhombifer*, and *C. bombifrons*, *Mecistops cataphractus*, and *Gavialis Gangeticus*, of various ages and sizes, without having been able to discover a trace of ventral scutes. This is the more remarkable, as the well-marked ventral and dorsal shields of many of the ancient *Teleosauria* would lead one to expect a corresponding exoskeleton (if anywhere) in their nearest allies, the modern *Gavialidae*. However, *Goniopholis*, with its strong armour, is more like an ordinary Crocodile; and I have recently discovered that a true Crocodile in some respects curiously similar to *C. bombifrons* (*C. Hastingsiæ*) was covered with scutes exceedingly like those of the modern *Caiman* and *Jacare*.

In minute structure the bony scutes of *Jacare* closely resemble those of such a fish as a Sturgeon: a middle layer, containing so many canals as to appear almost cancellated in longitudinal or transverse section, is covered externally by a thin, and internally by a thick, layer composed of bony lamellæ, nearly parallel to the plane of the scute. Round the canals of the middle layer, the bony lamellæ are disposed concentrically, to a greater or less extent. The lacunæ are of very various shapes; and there are perhaps as many short as elongated forms. The canals of the middle layer communicate by large branches with the inner, by smaller and fewer branches with the outer surface of the scute.

In the young *Jacare* mentioned above, I found the dermis to be

distinguishable into two layers. The more superficial of these is thin, made up of irregular or formless connective tissue, and contains many ramified pigment-masses. Its smooth outer surface underlies the rete mucosum. Internally, it passes into the second or deep layer, which consists of successive layers of distinctly fibrous connective tissue, disposed in definite parallel bundles, and having a very regular arrangement. Throughout a space corresponding with the area of each scale, in fact, the bundles of each layer cross those of the succeeding layer at right angles; and the successive tiers of bundles are tied together by short cords disposed perpendicularly to the planes of the tiers. A corresponding arrangement of the bundles of connective tissue has long been known to obtain in the dermis of Fishes and *Batrachia*. At each end of this small "mat" of connective tissue, the bundles, if I may so say, fray out; and at the anterior end, the layers, loosened in texture, bend upwards, spreading out at the same time to become continuous with the fibres of the "mat" in front. In consequence of the matting under the quadrate surface of each scale, the dermis has a peculiar faceted aspect, quite apart from any osseous deposit. Where bony scutes are formed, they appear as very thin perforated plates in the most superficial portion of the deep layer of the dermis; so that there is a single thin layer of dense connective tissue above them, while below them are all the rest of the denser and deeper lamellæ of the dermis. Through the apertures in this primitive osseous plate (the rudiment of the middle layer of the future scute), bundles of connective tissue extend, connecting the deep with the superjacent lamellæ.

If a thin section is made and decalcified with weak acid under the microscope, the calcareous matter, as it is dissolved away, leaves an obscurely fibrous matrix of a different aspect from the surrounding connective tissue, and the endoplasts, or nuclei, of this matrix are seen each to have occupied the centre of a lacuna.

Again, the rudimentary scute lies in the dermis as in a sort of pocket, the superficial and deep walls of which separate from it with great ease; and in good thin sections made through the dermis and scute, there seems to be no direct connexion between the substance of the scute above and below, and the connective tissue with which it is in contact. Nor could I satisfy myself that the margins of the scute were continuous with the surrounding bundles of connective tissue. However, the specimen had been a very long time in spirit; and I am unwilling to lay too much stress upon these observations, which tend to negative the supposition

that the scute proceeds from the direct calcification of the connective tissue of the dermis.

On the other hand, I must remark that horizontal sections of the scutes have presented oblique parallel fissures, sometimes crossing one another, which might readily be supposed to correspond with the lines of separation of ossified bundles of connective tissue.

NOTE.—During a recent visit to Paris, my friend Mr. Busk was kind enough to examine the specimens of recent *Crocodylia* in the Museum of the Jardin des Plantes, with reference to certain points to which I requested his attention. Mr. Busk informs me that there is no doubt about the transverse direction of the premaxillo-maxillary suture in *Crocodylus rhombifer*; and his statements lead me to entertain no question that *C. bombifrons* is a synonym of *C. palustris*.

In the typical specimens of *C. marginatus* and *C. suchus* of Geoffroy St.-Hilaire, the premaxillo-maxillary suture extends back to the level of the seventh tooth.

Mr. Busk has furthermore pointed out to me the existence of another American species of Crocodile—*C. Moreletti*, which has been described by M. Auguste Duméril in his "Description des Reptiles nouveaux ou imparfaitement connus," &c., 'Archives du Muséum,' t. vi. 1852.

This species inhabits lake Flores, in Yucatan; and it is said by M. Duméril to approach *C. Americanus*, from which it differs in the proportions of the skull and in the characters of the dermal armour.

June 21st, 1859.

On the Habits of the "Aye-Aye" (*Cheiromys madagascariensis*, L., Cuv.). By the Hon. H. SANDWICH, M.D., C.B., Colonial Secretary of the Mauritius. Communicated by Prof. OWEN, F.R.S., V.P.L.S.

[Read April 7th, 1859.]

"Mauritius, Jan. 27, 1859.

"MY DEAR MR. OWEN,—After very great difficulty and much delay, I have at length obtained a fine healthy male adult *Aye-Aye*; and he is now enjoying himself in a large cage which I have had constructed for him.

"He is a most interesting little animal; and from close observa-

tion I have learnt his habits very correctly. On receiving him from Madagascar, I was told that he ate bananas; so of course I fed him on them, but tried him with other fruit. I found he liked dates,—which was a grand discovery, supposing he be sent alive to England. Still I thought that those strong rodent teeth, as large as those of a young Beaver, must have been intended for some other purpose than that of trying to eat his way out of a cage—the only use he seemed to make of them, besides masticating soft fruits. Moreover, he had other peculiarities,—*e.g.*, singularly large, naked ears directed forward, as if for offensive rather than defensive purposes; then, again, the second finger of the hands is unlike anything but a monster supernumerary member, it being slender and long, half the thickness of the other fingers, and resembling a piece of bent wire. Excepting the head and this finger, he closely resembles a Lemur.

“Now as he attacked, every night, the woodwork of his cage, which I was gradually lining with tin, I bethought myself of tying some sticks over the woodwork, so that he might gnaw these instead. I had previously put in some large branches for him to climb upon; but the others were straight sticks to cover over the woodwork of his cage, which *alone* he attacked. It so happened that the thick sticks I now put into his cage were bored in all directions by a large and destructive grub called here the *Moutouk*. Just at sunset the Aye-Aye crept from under his blanket, yawned, stretched, and betook himself to his tree, where his movements are lively and graceful, though by no means so quick as those of a squirrel. Presently he came to one of the worm-eaten branches, which he began to examine most attentively; and bending forward his ears, and applying his nose close to the bark, he rapidly tapped the surface with the curious second digit, as a woodpecker taps a tree, though with much less noise, from time to time inserting the end of the slender finger into the worm-holes, as a surgeon would a probe. At length he came to a part of the branch which evidently gave out an interesting sound, for he began to tear it with his strong teeth. He rapidly stripped off the bark, cut into the wood, and exposed the nest of a grub, which he daintily picked out of its bed with the slender tapping finger, and conveyed the luscious morsel to his mouth.

“I watched these proceedings with intense interest, and was much struck with the marvellous adaptation of the creature to its habits, shown by his acute hearing, which enables him aptly to distinguish the different tones emitted from the wood by his gentle

tapping; his evidently acute sense of smell, aiding him in his search; his secure footsteps on the slender branches, to which he firmly clung by his quadrumanous members; his strong rodent teeth, enabling him to tear through the wood; and lastly by the curious slender finger, unlike that of any other animal, and which he used alternately as a pleximeter, a probe, and a scoop.

"But I was yet to learn another peculiarity. I gave him water to drink in a saucer, on which he stretched out a hand, dipped a finger into it, and drew it obliquely through his open mouth; and this he repeated so rapidly, that the water seemed to flow into his mouth. After a while he lapped like a cat; but his first mode of drinking appeared to me to be his way of reaching water in the deep clefts of trees.

I am told that the *Aye-Aye* is an object of veneration at Madagascar, and that if any native touches one, he is sure to die within the year; hence the difficulty of obtaining a specimen. I overcame this scruple by a reward of £10.

"I quite despair of obtaining the bones of the *Dinornis* or *Dodo*, though I have made every effort. I shall always be proud to be of service.

"Believe me, yours very faithfully,

"H. SANDWICH."

On the Moulting of the common Lobster (*Homarus vulgaris*) and Shore Crab (*Carcinus maenas*). By S. JAMES A. SALTER, M.B., F.L.S., F.G.S.

[Read April 7th, 1859.]

I AM induced to bring this subject before the Linnean Society, on account of the singularly perfect specimen of the thrown-off slough of a Lobster which I have now an opportunity of exhibiting, and because the process by which it was shed was witnessed and carefully watched by two competent observers—by my friend Mr. Robert Cooke, of Scarborough, a Fellow of this Society, and by the intelligent wife of the Curator of the Scarborough Museum, in an aquarium in which institution the occurrence took place.

The methods by which certain of the Decapod Crustaceans cast their old shells in the process of renewal and growth have already been made the subject of observation and record.

Réaumur, as early as 1712, and again in 1718, saw and described

the sloughing of the common freshwater Crayfish (*Astacus fluviatilis*).

It was witnessed in the common edible Crab (*Cancer Pagurus*) by Mr. Couch, in 1833.

Subsequently the moulting-process was observed by Mr. Gosse, in the Spinous Spider-crab (*Maia Squinado*).

Beyond these three recorded examples, I believe that the actual operation of moulting in Decapods has never been seen, though the sloughs of our common Crustacea, and the animals themselves but recently emerged from their old shells, are familiar to all marine zoologists.

There is no recorded account of the moulting of the Lobster, that I have been able to discover.

The Lobster from which the slough was obtained, and whose operations are the subject of this communication, was an inhabitant of a large marine aquarium in the Museum at Scarborough. The period was July 1857. The aquarium contained the ordinary assemblage of sea-shore animals, and a considerable collection of vegetation, which consisted of *Ulva*, *Fucus*, and other common sea-weeds.

For two days previous to its throwing off the shell, the Lobster was observed in a very peculiar attitude, and to be very busily engaged. Its abdomen was permanently and stiffly erected and straight; while the animal, in this rigid attitude, was hard at work detaching and carrying all the soft sea-weed it could collect to one end of the aquarium, where it thus accumulated a large mass of vegetation, which was afterwards destined to become a screen and protection for its soft body. At the same time, and by the same means, a clearing was made at the other end of the tank, in which it had space for the evolutions which were subsequently necessary for the extrication of its body.

The Lobster remained in the peculiar rigid attitude I have described, during the entire two days previous to the moult. On the third day, a crack was observed along the membrane which unites the dorsal surface of the first abdominal ring with the carapace; and when these parts became separated by about half an inch, the bright-blue membrane of the new shell being plainly visible beneath, the operation of extricating the abdomen commenced. By a strong vibratory action of the whole abdomen, principally in a lateral direction, one segment was, at first, protruded through the split; and this was followed by an interval of complete repose, during which the animal remained quite motionless.

tionless. Then, by another vibratory action, the second segment was extricated; then followed an interval of repose, when the third was withdrawn; and so on till, at last, the entire abdomen, after having been bent double upon itself, was turned completely out backwards, and then, elongated and compressed, remained above and parallel to the empty shell that it had occupied, and which was still attached to the under surface of the cephalo-thorax. Hitherto the only orifice of escape consisted in the transverse splitting of the first abdominal segment from the carapace, on the dorsal surface. None of the abdominal segments separated from each other.

Thus far the extrication had commenced at the front of the abdomen, and had progressed from before backwards. It was now observed that the carapace had split from behind forwards, the fissure commencing posteriorly at the transverse split between the carapace and the first abdominal segment, and reaching forwards to the apex of the rostrum, which, however, it did not absolutely divide. The two halves of the carapace then separating posteriorly, the interval between them, together with the original transverse slit, constituted a trifold opening, through which the rest of the animal escaped.

The escape of the cephalo-thoracic portion was effected from behind forwards. First the posterior ambulatory legs were loosened and withdrawn; then followed the next pair; and this process was continued from behind forwards, pair by pair—the withdrawal of each pair of legs being followed by an interval of repose. The limbs were withdrawn very readily from the old shell, slipping out of it as a leg would from a loose boot. No apparent effort accompanied these operations so far.

The extrication of the claws, however, was attended with much and violent exertion. This consisted of two powerful and sudden tugs, the soft abdomen of the Lobster pressing by its under surface upon the upper surface of the empty shell. By this means the soft chelæ were drawn through the narrow joints of the old shell, exhibiting strong, unmistakeable marks of the violence and pressure to which they had been subjected. The escape of the chelæ from their unyielding incasement was not aided by any splitting of the old shell, the large soft hands being drawn by compression through the narrow joints, as a wire is drawn through the contracting holes of a draw-plate.

The efforts for the withdrawal of the chelæ were the last, and succeeded in completely freeing the Lobster from its old case.

Not only the claws, but the parts of the mouth, the antennæ, and the eyes, were all unsheathed; and with the last tug the regenerate Lobster plunged backwards, and entirely escaped, above and behind the now empty shell—its former tenement.

The operation, from first to last, occupied about twenty minutes, and was performed entirely in view, in that part of the aquarium which the Lobster had cleared of sea-weed.

Immediately after emerging from the old shell, the Lobster, was much deformed: there was a general elongation of the whole animal; but this was most remarkably the case with the claws, which were quite drawn out of shape. During the few subsequent hours, both the body and the claws became shorter and much enlarged. This increase of size did not result from any unfolding of membrane of the shell previously plicated, as no folds were observable immediately after the emergence of the animal, but from a simple distension, apparently from the imbibition, either by swallowing or by endosmosis, of considerable quantities of water. The membrane of the new shell was perfectly soft, and of a bright blue colour. At first the Lobster was shy and quite inactive, retiring to and remaining concealed among the accumulated sea-weed; but in a few hours it emerged from its retreat, and moved freely about the aquarium. The membrane of the new shell remained soft for some days, but on the seventh it appeared to have become perfectly calcified.

These are the details of the exuviation of the Lobster whose cast-off shell is before the Society. By a happy accident, the same observers had an opportunity of witnessing the sloughing of another Lobster, in the month of November following. The process was identically the same in every particular; but it was observed that the subsequent calcification of the shell did not take place till after the lapse of about fourteen days,—a circumstance probably dependent on a lower temperature and a less active nutrition. These are, I believe, the only two instances in which the exuviation of the Lobster has been actually witnessed; but there exist specimens of sloughs which are entirely in keeping with this description. In the fish-house of the Zoological Society of London there are two specimens which were cast in the tanks there; and in each there is the same transverse splitting of the carapace from the abdomen, and the longitudinal splitting of the carapace itself, without any other opening for the escape of the animal.

One or two general observations are suggested by the foregoing
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description. In the only examples of the exuviation of macrourous Decapod Crustaceans, there exists a singular diversity in the process itself. In *Astacus*, as described by Réaumur, the process commences with the escape of the cephalothorax; in *Homarus*, as I have now described it, it begins by the emergence of the abdomen. In *Astacus* the carapace is detached and thrown off bodily and unbroken, being severed from its attachments with the lateral portions of the cephalothorax, as is the case in the Brachyura; whereas in *Homarus* the lateral attachments of the carapace remain, whilst the plate itself is split up the centre. In *Astacus*, as is also the case in the Brachyura, the thrown-off slough is uniformly left resting on its dorsal surface; in *Homarus* the reverse is uniformly the case. But the most striking dissimilarity is to be found in the circumstances stated to attend the liberation of the chelæ. Prof. Bell, in the Introduction to his 'History of the British Stalk-eyed Crustacea,' remarks—"It is impossible to imagine that the crust of the legs, and especially of the great claws of the larger species, could be cast off, unless it were susceptible of being longitudinally split" (p. 35), and he then proceeds to give the account detailed by Réaumur of the longitudinal splitting of the shell in the neighbourhood of the joints of the claws in *Astacus*, so as to allow of the extrication of the hands. Nevertheless, however impossible it may appear for the chelæ to escape without this splitting, no such circumstance occurs in the exuviation of *Homarus vulgaris*; and when we consider that the hands of *Astacus* are small in proportion to the wrist-joints, and that in *Homarus* they are larger in proportion to those joints than in any other of the Macroura, this dissimilarity in the mode in which the claws escape is the more remarkable, and, I confess, to my own mind it suggests the suspicion that the distinguished and usually most accurate French naturalist to whom I have referred may possibly in this instance have been led to consider as a fact that which was to him a supposed necessity*.

Since the foregoing account of the moulting of the Lobster was written, I have dredged a specimen of the common shore-crab (*Carcinus menas*), in the act of casting its shell. This little crustacean had taken refuge, no doubt for the safe and secret per-

* The suspicion above expressed has been fully confirmed by observations made by Mr. J. J. Bennett, the Secretary of the Linnean Society. Mr. Bennett informs me that, in an aquarium in his possession, an *Astacus fluviatilis* has twice cast its shell, and the process of moulting was on each occasion accomplished without any splitting of the shell at the joints of the claws.

formance of sloughing in a forest of *Zostera*, on one of the mud banks in Poole Harbour, and while scraping these weeds with a keel-drag it fortunately fell into my net. It shows how the Brachyura leave their old shells by the horizontal splitting away of the carapace from the other portions of the shell—the carapace itself remaining entire; and it also shows (and this was my principal object in exhibiting the specimen) the enormous amount of increase of size upon emerging from the shell, and the rapidity with which that increase takes place. The animal, as now seen, is in exactly the same state as when taken out of the water, and its bulk is probably some four times larger than the area of the shell in which it had been encased only a few minutes before. I retained the Crab in connexion with its old shell, and prevented its further escape by wrapping it in paper, so that it could not move its limbs. I thought such a specimen would be telling and illustrative, and that the old shell, being in contact with the new, would afford facilities for contrast. In this condition the Crab died, and, being out of water some time, it became dry, and the soft new shell collapsed and bulged in; but, upon placing the dead Crab in sea-water, the soft shell very speedily imbibed sufficient fluid to distend it to its previous dimensions. This of course was simply the effect of endosmosis. Mr. Couch, in describing the moulting of the common Edible Crab (*Cancer Pagurus*), speaks of its *drinking* large quantities of water, and *thus* becoming distended; but I rather think that the distension takes place by endosmosis, even during life. There are two circumstances which militate against Mr. Couch's opinion:—first, the rapidity with which the distension occurred in the Crab I have just exhibited, while still in the act of moulting; and secondly, that after death the same distension occurred when the Crab was immersed in sea-water; in which case it could only be by endosmosis. Indeed to me it seems very probable that this very endosmosis, when the water once comes in contact with the new, uncalcified shell, may, by distending it, be the main agent in the breaking open and dissevering of the elements of the old shell.

On the Shell-bearing Mollusca, particularly with regard to Structure and Form. By ROBERT GARNER, Esq., F.L.S.

[Abstract of a Paper read before the Society.]

THE author commences the paper, of which the following is the substance, with some general observations on the morphology of

animals. He thinks that the idea of an ascending and successive scale or chain of creation is, in the main, correct, when the great classes, and not species or genera, are made the links,—the disturbing or modifying influences being due to modes of life, food, habitat, &c., and causing a different (say the quinary) distribution. He is an advocate, too, for the doctrine of one fundamental plan of organization, and thinks that, in the zoophyte, there is a real union of both the animal and vegetable *nirius*.

The great divisions of this chain, the *radiate*, *articulate*, *molluscous*, and *vertebrate*, constitute an ascending series; the links of the chain, so to speak, being in each case, for such an extent, of a particular pattern; but, nevertheless, one of the highest mollusks may surpass in organization one of the lowest fishes, or an articulate creature a mollusk. The author considers such great divisions of animals, as well as minor ones—the gasteropodous mollusks, for instance—as realities, and not mere abstractions; and that they are independent of the circumstances of food, habitat, locomotion, &c., just referred to. So great, however, are these disturbing influences, that they often produce an extraordinary external resemblance or pseudo-analogy between animals of a very different nature, as between a *Chiton* and an *Oniscus*, and they are connected intimately with, though not the cause of, what we call specific or generic distinctions. Aërial life, in contradistinction to aquatic, raises much the character of the locomotive organs; yet this is subordinate to type: hence the creeping Mollusk appears to have commonly a higher organization than the flying Insect.

The cartilages of *Sepia* have a true resemblance to those of a Skate, and the Cirrhipede truly connects the Mollusk with the Crustacean. The author regards *Dentalium* as a gasteropod, differing in this respect from Lacaze-Duthiers, whose beautiful paper, however, renders it supererogatory to say anything more on this animal, except that the author believes that the presence of the spiniferous tongue, of a proboscis, and the nature of the food, are favourable to his view: he also takes the feathery tufts to be the branchiæ.

The anatomy of *Aspergillum* is similar to that of *Pholas*; its mantle, however, is all but closed in front, and ends in an obliquely-set muscular disk, applied to the internal surface of the rose of the so-called *arrosoir*, the openings of this part of the shell giving exit to certain processes and fimbriæ of the fleshy disk,—a narrow slit being also left in both the muscular and shelly disks for the exertion of the small, compressed and curved foot. The

animal is enveloped within the shell by a rather horny, general membrane.

The author touches upon the anatomy of some other genera of Lamellibranchiata. *Solemya* has its firm, horny, dark cuticle doubled inwards from the valves over the tubular mantle; behind, it has an anal opening, and a second fringed branchial slit lower down: the branchiæ and tentacles are single on each side, the former being remarkably feather-like. The foot is similar to that of the *Solens*, but crenate round its anterior disk. *Cyrenoidea* has the mantle closed below, but with two openings behind, the upper one with a semicircular internal fringe, incomplete above; a callous rim and fringe surround the mantle, which has also a third opening for the long, compressed, bent, and blunt foot. This last has a remarkable crystalline body, directed from the stomach to the pedal pore, apparently, as in *Cardium*, subserving by its elasticity to the extension of the foot, and consequently to locomotion; at any rate, it is not a sexual distinction. The external branchiæ are short, and the upper or internal branchial cavity does not communicate with the lower one. The renal organ opens near the branchial nerve, and the ovary at the base of the abdominal mass. *Trigonia* is remarkable for its beautifully fringed, open mantle, its pectinated pits for the secretion of the teeth, and the large scythe-shaped foot, trenchant before and peaked behind, and having a fringed disk. *Vulsella* is allied to the Oyster, but more so to the *Pectens*, having a small cylindrical grooved foot and appended visceral mass, but no byssus; the rectum perforates the heart, and has a tentacle above its opening. *Perna* has a similar foot, and a very bulky byssus, with a large muscle attached to their base; the lips resemble those of the Oyster. The anatomy of *Cronia* is little different from that of *Orbicula*, as described by Owen,—the beautiful arms folded in several coils, with a simple mouth at their base, the stomach and short intestinal canal surrounded by the liver and hearts, and terminating by a lateral bend; the ovaries ramifying in the mantle; the adductor muscles being four in number, with some bands to the mantle; and on the latter, glandular markings corresponding with the microscopic sculpture of the shell. With respect to *Anomia*, the author has again been anticipated by Lacaze-Duthiers, though he has already given, in another paper, most of its anatomy and morphology: he would simply call attention to its very long and curious crystalline stilette, unconnected with the minute foot.

With respect to that *questio vexata*, the sexes of the Lamelli-

branchiata, he observes that any number of individuals of *Cyclas* may be examined, and young fry will be found in the branchial laminae in all; that all Oysters have ova, and also all individuals of *Pecten maximus*, the subpedal mass being visibly composed of an ovary and a testis. He is obliged to believe that one species of British *Anodon* is universally oviferous. But the common Edible Cockle appears to have the individuals of different sexes, and the same may be said with regard to *Mytilus edulis* and *Patella*.

The spermatozoa in the Cockle are oblong and a little curved, and torulated, as it were, whilst they are pear-shaped in *Mytilus*; they are also extremely minute, and their appendages must be very fine, for with a power magnifying 500 diameters they are scarcely to be seen.

In the shell of a *Patella*, *Emarginula*, or *Haliotis*, we have the two conjoined valves of a lamellibranchiate mollusk; and through such forms as *Calyptræa*, *Hipponyx*, *Navicella*, and *Nerita*, we arrive at the ordinary form of the gasteropod with its operculum.

Then follows a disquisition on the progressive tendency to a spiral geometry in these animals, due to a varying plan of conformation, and not to the force of the heart, there being generally an atrophy of the left side of the body. In *Nautilus* and *Argonauta*, the shell and mantle are reversed in position to what they are in the Gasteropods, whilst *Sepia* and *Hyalæa* agree rather with the latter. The symmetrical shell of the lower Gasteropods undergoes a lateral torsion in the higher, spiral forms, to become again symmetrical in the Cephalopoda. The branchiæ in *Patella* retain a position analogous to that of the same organs in the Lamellibranchiata; in some Chitons they have a tendency to retract towards the anus, as in *Doris*; in *Fissurella* they waste at the sides and become developed above the neck, as in the spiral Gasteropods; but in them, the right branchia, and right side of the mantle are principally developed. From this torsion arises the form and spire of the shell. In *Aplysia*, where the branchial fissure is far back and to the right side, the right respiratory nerve preserves a superior position, and passes backwards to form its ganglion at the front of the branchial opening; the left, on the contrary, passes under the œsophagus to form a second ganglion, not mentioned by Cuvier, behind the first. In the more spiral Gasteropod the torsion is greater; the right nerve, for instance, mounts upwards over the digestive canal to form its ganglion quite in the left flank, whilst the left goes below the digestive

canal to attain the right flank. In *Sepia* the branchiæ are again symmetrical and abdominal.

The shell of the young *Sepia* is composed of distant plates, only connected by minute transversely striated laminae or flattened tubes, producing by their insertion a beautiful appearance of sinuous lines, very like those of a *Baculite* or *Ammonite*; and the spongy part of the shell, so constituted, is probably filled with air from the cavity of the body situated immediately in front, the intervening membrane having a peculiar structure. This cavity of the body exists in much lower mollusks; air being apparently secreted in it, to lighten the animal.

The author thinks that, in considering the anatomy and form of the body of the Gasteropoda, about ten species may be taken as types of corresponding families.

1. *PATELLA and its congeners*.—He claims to have been one of the first to show the termination of the oviducts and renal organs between the processes of the branchiæ in the Chitons. As they are commonly phytivorous, the intestine is often very long and disposed in large coils, in double apposition; the buccal apparatus is very remarkable. *Chitonellus* differs but slightly from *Chiton*, the central elements of its tongue, however, being little developed, though having the same tessellated basement membrane. The tongue of *Emarginula* differs much from that of *Patella*, having an immense number of serrated side-hooks and a dilated middle portion.

2. *CALYPTREÆ, &c.*—The mollusks of this division have often supranuchal branchiæ, as have some of the last; the sexes also are frequently separate, rendering copulation necessary; and they are sometimes partially spiral, with a tendency to form an operculum. However, the little *Ancylus fluviatilis* appears to be what is commonly called hermaphrodite, with a branchial lamina on the left side, together with the heart and openings of the genital organs; the stomach has a cæcum, and the penis a long filiform appendage; the female parts opening near the rectum and behind the male organs. It must respire by water rather than by air, for, in a rapid stream, the stones at the bottom are covered with *Ancylus* (upon which also its round oothecæ, each containing four or five ova, are deposited), and it appears impossible for them to get to the surface to breathe. On the contrary, the lake-*Ancylus*, though the margin of its mantle is ciliated, may perhaps come to the surface, ascending the stalks of the Water Persicaria, on which it is mostly found, and on which its oothecæ are deposited. When the dark cuticle of this last minute creature is removed,

its organs may be seen to be reversely disposed to those of the larger species, the heart being placed to the right, before the apex of the shell, and the rectum also on the same side.

3. *DORIS*, &c.—The little *Doris aspera* swims, back downwards, on the surface of a glass of sea-water, copulates, and deposits its semicircular oothecæ. The brain of the common Lemon Doris is of a fine orange colour, enveloped in a glandular matter, and is constituted by a complicated assemblage of ganglia: there are acoustic sacs and dark ocular spots upon it. There are six ganglia on the buccal mass, and about six or eight minute ones on the stomach. The anal sac appears to be a purple- or ink-bag; and the so-called matrix is composed of a peculiar substance, swelling enormously in water, of which it renders a large quantity viscid, and being also coagulable by alcohol and bichloride of mercury, but not by heat. Spermatozoa were found in the genital vesicle, as well as in the epididymis and its cæcum. The spines of the lingual plate are uniform, and in number about 10,000.

4. *APLYSIA*, &c.—*Aplysia* has been before alluded to. Cuvier, in his generally beautiful drawings, has scarcely done justice to (5) *Ianthina*, nor to its beautiful float and ootheca; it is peculiar for its fins, and the disk at the back of the foot. With respect to *Magilus*, it should be removed from the (6) Tubuli-branchiata, its animal being a *Purpura* in structure, with a bent horny operculum, and a very long linear appendage on the right side of the head, leading to the supposition that the animals are of different sexes, though there seem to be difficulties in the way of sexual congress. In the specimen examined, the spire of the shell was not solidified; the animal had a short proboscis, with rather bent subulate feelers, and eyes on the outside; it had also a rich purple secretion near the rectum on the right side.

7. *TROCHUS*, &c.—Some of the species of *Trochus* surpass even *Emarginula* in the beauty of their lingual apparatus. The renal organ opens into the bottom of the branchial cavity, contrary to its disposition in *Helix* and *Lymnaeus*, where its exit is near the respiratory orifice. In *Planorbis*, that part of the respiratory cavity receiving the excretions seems separated by an imperfect valve from the right portion. With respect to the secretion of this organ, it consists, in both Gasteropoda and Lamellibranchiata, of numerous pellucid globular bodies, containing opaque earthy nuclei or granules, and presenting different appearances in *Anodon* (for instance), *Cyclostoma*, *Buccinum*, and *Helix*. When these bodies are incinerated, lime is left, which in some cases appears to have been combined with oxalic acid. The little *Nerita litoralis* presents

the structure of the Turbonidæ very prettily and in small compass, particularly in the very long spiral tongue. *Delphinula* has the fringed mantle and sides and very wonderfully armed tongue of the other Trochidæ. *Melania* is of similar organization to our well-known *Paludina*, the stomach compound, the mantle and bilobed head fringed, and the latter marbled like that of *Paludina*. *Ampullaria* appears to be truly amphibious.

8. *BUCCINUM*, &c.—*Natica* presents much the same structure as the common *Buccinum*, but has a muscular disk anterior to the mouth,—a disposition, with some variations however, found in other mollusks. The first and second stomachs are at a distance from each other, the tongue is little developed, and the branchiæ (often single in the Turbonidæ) two in number. *Purpura* also differs but little from *Buccinum*. *Ovula* is a less attainable mollusk: the foot is long and rather narrow, and subventral rather than subtrachelian, with a sinuosity on the right of the neck, where also is a short hooked penis in the male, receiving a vas deferens from near the rectum behind; there is a large and small branchia, and the reflected portion of the mantle is covered with tubercles and tentacles,—no doubt a fine garnish in the living animal; the mouth has a muzzle, and there are small eyes on the external sides of the curved, awl-shaped tentacles; the elements of the tongue are beautifully toothed and serrated.

9. *LYMNÆUS*, &c.—Of the air-breathing aquatic and (10) terrestrial gasteropods the most interesting particulars are their generative organs, which the author proposes to re-examine. The brain of *Helix aspersa* is composed internally of pyriform or oval ganglionic vesicles, each giving origin to one or more nervous fibres. The acoustic sacs are similar to those of *Doris*. The nerves from the upper part of the ring are enveloped in a darkish neurilemma, and comprehend no doubt olfactory, optic, and tactile twigs; there being the buccal ganglia for taste, and the acoustic sacs for hearing; the twigs, however, forming the buccal or pharyngeal ganglia have a broad double root on each side, near the origin of the above three nerves. The lower part of the brain is very analogous to that of *Sepia*, giving off nerves to the foot, and external and internal respiratory ones to the mantle, respiratory opening, branchiæ, &c. *Lymnæus* has the cephalic ring formed by about twelve ganglia, exclusive of two large and two minute ones on the buccal mass. The upper portion of the ring has ganglionic swellings, but in other respects the nerves are as in *Helix*. Its lower portion consists of two pedal nerves, and has the

acoustic spot and a minute ganglion upon it; behind, this lower portion consists of five ganglia connected with both the anterior and upper swellings by a cord, but separated from the former by the aorta, as usual, and giving nerves to the flanks, pulmonary orifices and sac, heart, stomach, and viscera. The lower ganglia are bright yellow.

With respect to the Pteropoda, the branchiæ in *Hyalæa* exist as a delicate membrane under the swollen part of the shell, in structure much like the same part in the Ascidians, the inlet being through the anterior opening of the mantle. There are eyes at the fold of the mantle behind, and two small tentacles above the mouth; the heart and rectum being on the left side, and the generative opening at the base of the right ala. *Cleodora* is a very beautiful creature, with the same disposition and structure of viscera; brain-spots but no eyes were visible; the mantle had beautiful muscular bands; the branchiæ as above; the buccal apparatus is imperfect in both. *Cleodora* has similar membranous expansions with *Hyalæa*, and also a sort of triangular lip.

Argonauta has a lachrymal pore before and beneath the eye. The beautiful and obvious respiratory mechanism in the Cephalopoda needs not to be described. There is a large sac behind the viscera of the Argonaut, which opens on each side; it is perhaps of some hydrostatic use. There are at least three pairs of salivary glands, of which four open on the floor of the mouth, and two or three at the commencement of the gullet. Several small shells of Pteropoda and fragments of Cephalopods were found in the stomach, on which was observed the large nervous ganglion found in all these, as well as in lower mollusks. The branchial nerves have each two ganglia, of which the last at the root of the branchiæ is rounder than the other; the branchial hearts have processes as in *Sepia*. In *Sepia* two openings lead from the respiratory sac into the cavity containing the venæ cavæ and their secreting appendages often imbued with glittering crystalline particles, and from the above cavities a wider opening on each side leads into a second sac further back, situated in front of the shell. There are auditory sacs in the Argonaut. The oviducts have separate openings, but originate together. Both *Sepia* and *Argonauta* are infested with a subcutaneous filiform entozoon, hooked anteriorly and rolled up spirally in the former. *Loligo media* and *Sepiola* have but one oviduct, and the two large, glandular, laminated organs, opening at their summits, are wanting in *Argonauta* and *Octopus*. In *Sepiola* one would almost think that copulation takes place, for the

author has taken what he supposes to be the capsules of Needham, with dilated oval ends, tubular and bent pedicles or processes, enclosed elastic filaments, and adhering zoosperms, from the oviducts of the female: he has made the same observation also in *Sepia*. The latter has very similar male organs to *Ocotopus*, as described by Cuvier. In the embryo *Sepia*, the yolk enters below the mouth and opens into the upper stomach, but the beak of the animal also appears to be inserted into it behind. The vitellus in reality therefore enters by the foot, as it does in *Bulimus*, and probably in all Bivalves.

On the Linnean Manuscript of the 'Museum Ulricæ.'

By SYLVANUS HANLEY, Esq., F.L.S.

[Read Dec. 3, 1858.]

NOT the least important result of the investigations of the Committee appointed by the Linnean Society to examine the condition of the collections and manuscripts of Linnæus, was the rediscovery of a written copy of the 'Museum Ulricæ.' The volume was manifestly, from internal evidence, a legible transcript of the original manuscript of that work, with alterations and interpolations in the peculiar handwriting of the author. It was, indubitably, the unpublished catalogue so often mentioned in the tenth edition of the 'Systema,' and contains descriptions of certain species alluded to as defined, yet, strangely enough, omitted in the printed edition. It is worthy of notice for many reasons: it corrects the frequent misprints; explains the many fallacious allusions to preceding species, their sequence being very different; it exhibits those early synonyms, which, culled from comparison with the actually described specimens, had been eventually supplanted by supposed better representations; above all, it imparts to us those original headings, or diagnoses (condensed from the subsequent details), which had been suppressed, of old, in favour of those already published in the 'Systema.'

This wholesale substitution, adopted by Linnæus, as a ready method of avoiding a tedious revision of all the headings, when he absorbed in the more comprehensive groups of his 'Systema' the members of manuscript genera he had determined to reject, involved a serious amount of confusion; for, oftentimes, the species of the two works, although designated by the same appellations, were totally distinct; and the combination of the diagnosis of the one with the details of the other displayed an array of features not known to be associated in any object in nature.

The generic arrangement exhibited in the manuscript differs essentially from that which appeared in the final edition of his 'Systema Naturæ.' As a whole, it is decidedly inferior, yet it segregates certain natural groups, such as *Lyra* and *Cassida*, the value of which have been acknowledged by all modern naturalists. The following list and sequence of the genera comprised in it, cannot, indeed, be regarded as an entire system, for certain groups, viz., *Chiton*, *Lepas*, *Teredo*, *Sabella*, and the typical forms of *Mya*, *Mactra*, and *Anomia*, were not at that period represented in the Museum; but it is not devoid of interest, since it manifests a transitional stage in the progressive advance to that matured scheme which was finally elaborated in the pages of his revised 'Systema.'

Dentalium.	Haliotis.
Patella.	Nautilus.
Nerita.	Cymbium (=Argonauta).
Helix.	Spondylus.
Turbo.	Ostrea.
Trochus.	Pecten.
Turricula.	Arca.
Buccinum.	Pinna.
Lyra.	Mytilus.
Morion.	Solen.
Conus.	Tellina.
Voluta.	Chama (not that of the 'Systema').
Strombus (not that of the 'Systema').	Cunus (=Venus).
Harpago (=Strombus).	Pholas (not that of the 'Systema').
Murex.	Trunculus (=Donax).
Cassida.	Bucardium (=Cardium):
Cypræa.	
Bulla.	

Besides the four genera (*Chiton*, *Lepas*, *Teredo*, *Sabella*) that were excluded from this catalogue, either from the absence of specimens, or from mistrust of their being veritable Testacea, six of the remaining 32, namely, *Pholas*, *Mya*, *Mactra*, *Chama*, *Anomia*, and *Serpula*, were likewise omitted, not being yet eliminated from *Solen*, *Bucardium*, *Spondylus*, *Ostrea*, and *Dentalium*. To counterbalance these, we find no less than eight subsequently abandoned groupings:

Turricula (an undefined amalgam of the long-spined species of *Buccinum*, *Murex*, and *Strombus*).

Lyra (the *Harpa* and *Purpura* of the Lamarckian school).

Morion (an unnatural compound of *Eburna*, *Auricula* proper, *Pythia*, &c.).

Strombus (a combination of the immature members of the received genus with *Pyrula*, *Fasciolaria*, and other allied forms).

Cassida (nearly the modern *Cassis*).

Pecten (equal to *Lima* and *Pecten*).

Chama (the *Tapes* of recent conchologists).

Pholas (chiefly composed of *Artemis* and *Lucina*).

It may be remarked, moreover, that the simple univalves commence, and the bivalves close the series; the exact converse of the order in which they are marshalled in the two principal editions of the 'Systema Naturæ.'

I feel assured, after a careful study of the manuscript, that the names eventually allotted to the shells of the 'Museum' did not result from a careful comparison of the royal specimens with the typical examples in the private collection of our author, but were attached to the species, either from the identity of the written and printed synonymy, or from the general accordance of their described features with the meagre characteristics enumerated in the prior publication.

The erased nomenclature of the species, however, was very dissimilar, and was scrupulously based upon a supposed identity of the specimens with those delineated by Rumphius, Klein, and d'Argenville. Assuredly at that period of his career, our author entertained the same profound respect for the laws of priority which is professed by all modern naturalists; and I hesitate not to affirm that, from the crude and inharmonious theories of his predecessors, he eliminated a system of Conchology that was better suited to the requirements of the age he lived in than any more elaborate arrangement would have been. For simplicity attracts the student, whom a more complex (even if more natural) method would repel; and for the collection of an adequate mass of materials wherewith, eventually, to build up a more symmetrical and widely-based structure, a multitude of comparatively unskilled labourers is more efficacious than a small knot of the most erudite architects.

Before inviting the attention of my readers to the original headings of the 'Museum Ulricæ,' and to my brief account of the variations in the written copy from the text of the printed version, I must premise, that it has not been my practice invariably to notice, in the summary, such trifling differences of construction as the preferential use of the ablative for the nominative case, where the verbal change involved no alteration of the precise meaning.

MUSEUM LUDOVICÆ ULRICÆ REGINÆ.

CONCHYLIA.

CHITON. LEPAS.

Nothing relating to these two genera was found in the copy.

PHOLAS.

The *Pholas* of the manuscript is perfectly dissimilar to that of the 'Systema.' Our author had evidently, when he first wrote the 'Museum Ulricæ,' not appreciated the remarkably striking characteristics of this group, having located the only species he then knew (for *P. candidus* seems a subsequent discovery) with the *Solens*.

P. CANDIDUS. Not mentioned in the manuscript.

P. CRISPATUS. *Sol.* ovatus, obtusissimus, cardinis dente depresso rotundato.

The Appendix to Lister was not cited; "Habitat in Anglia, Suecia," was appended to the description, which in many respects was inferior to the published one. The account of the hinge was merely "Cardo dente dilatato rotundato extus excavato."

MYA.

The three incongruous forms assorted as *Myæ* were not so united in the MS.; the second being very properly placed with the *Mussels*, the other two ascribed to *Solen*.

M. LUTRARIA. *Sol.* ovali-oblongus, cardine laterali dilatato semiorbiculato.

In lieu of the reference to Lister (whose work does not appear to have been consulted by our author at the period when this portion of his manuscript was written), plate 45, figure N, of Rumphius was quoted as illustrative. The published account of the hinge is much more complete than the written one, which was apparently drawn up from a worn specimen; it ran as follows: "Cardo extus vix gibbus, intus constans laminis 2 semi-orbiculatis concavis introrsum spectantibus."

By a slip of the pen, in my 'Ipsa Linnæi Conchylia,' I had termed Brown's figure of the Linnean *Mya lutraria*, *L. oblonga*, instead of *L. elliptica*.

M. PERNA. *Myt.* lævis, cardine terminali unidentato.

The intended name was *M. Magellanicus*.

M. VULSELLA. *Sol.* oblongus, linguæformis, cardine terminali dilatato semiorbiculato.

"Pinna linguaformis subfalcata" was written after the reference to the 'Museum Tessinianum;' hence it seems that Linnæus did not himself consider that he had used the binomial method in that work, or he would have quoted it as *P. lingulata*.

"Rumph. 148, t. 46. f. A," and "Gualt. t. 90. f. H," were the unpublished synonyms.

SOLEN.

Testa valvulis utrinque hiantibus. Cardo dente unico inflexo recurvo.

The *Mya lustraria*, *M. vulsella*, and *Pholas crispatus* were originally included in this genus.

S. VAGINA. *S. linearis* rectus, cardinibus unidentatis.

"Habitat in Indiæ littoribus arenosis : in mari Rubro (*Hasselquist*)" was the recorded locality in the MS., where the European shell delineated by Gualtieri was not then included : "Klein, 163. t. 11. f. 65" (a copy from the cited figure of Rumphius) was its substitute.

S. SILIQUA. *S. linearis* rectus, cardine altero bidentato.

The wretched drawings of Argenville were not quoted ; but "Bonan. 2. f. 56" (error for 57), "Planc. t. 3. f. 6," and "List. Ang. 192. t. 5. f. 37," were cited instead.

S. ENSIS. *S. linearis* subarcuatus, cardine altero bidentato.

The final remark was not in the MS.

S. CULTELLUS. *S. ovali-oblongus* curvatus.

"Habitat in Amboinæ littoribus arenosis" is an addition of the MS. The intended name (derived from Rumphius) was *cultriformis*,

S. RADIATUS. *S. ovalis*, cardinis costa tereti.

"Habitat in littoribus arenosis Xulii (?) Amboinæ" is an addition to the published account. The intended specific name was *violaceus*, an appellation bestowed upon it by Rumphius : "*solida*" was an emendation.

S. STRIGILATUS. *S. ovalis*, oblique striatus.

"Bonan. 2. f. 76" (error for 77) was an unpublished synonym.

S. ANATINUS. *S. ovatus* membranaceus, costa falcata.

Rostrum anatis was the intended name.

TELLINA.

Testa altero latere inflexa. Cardo dentibus aliquot, raro lateralibus.

T. GARGADIA. *T. antice* rugosa, rima dentata.

The absurd "marginis posticum latus remotum" was a misprint for (dens) "marginis posticus, latus, remotus."

T. LINGUA-FELIS. *T. subovata* scabra.

"Klein, t. 11. f. 62" (cited in the 'Systema'), and "d'Arg. t. 25. f. G" (the description of which suits better than the drawing) are the additions of the MS. : "*sesquialtior*" was the printed emendation of "*latior*."

T. VIRGATA. *T. ovata*, striis transversis retrorsum imbricatis, dentibus lateralibus.

The erroneous reference to d'Argenville was not present : "Klein, 158. Tellina virgata Rumphii" had been added by Linnæus. A very large portion of the printed account is wanting in the MS., to wit—"seuales. Intus radiis obsolete incarnatis picta." "Labris rugosis et scabris," "hymene tectis. Anus est rima concava," "primores," "transversi cum cavitate pro oppositis dentibus," "longitudinalem." The "retrorsum" was originally "sursum" ; "dextrum" was "sinistram" ; "Tertius dens" was "Altera testa."

T. GARI. *T. ovalis, striis transversis retrorsum imbricatis, dentibus lateralibus nullis.*

The *G* in the reference to Rumphius, and the *F* in the reference to d'Argenville were misprints for *D* and *I*, and were so published in the 'Systema': the "*primoribus*" was an emendation.

T. ALBIDA. *T. ovalis, lævis, nymphis prominulis.* "*Primorea*" was an emendation. The species was unnamed.

T. FOLIACEA. *T. antice scabra, rima serrata.*

The Rumphian name "*folium*" was the intended appellation: "*Klein, 162. t. 11. f. 64*" was cited, as in the 'Systema': "*aciatum*" was the reading for the printed "*acutum*."

T. PLANATA. *T. ovata plana, transversim striata, marginibus acutis.*

The erroneous reference to Gualtieri (whose figure *C* looks more like the species than his *G*) is not to be found in the manuscript. The species was not named.

T. LÆVIGATA. *T. ovata lævis, nymphis intractis.*

The figure of *T. chloroleuca* in Rumphius was not quoted, neither was the hence-derived appellation attached: the "*radiato*" and "*primoribus*" were also subsequent additions.

T. RADIATA. *T. ovali-oblonga, longitudinaliter substriata, sutura postica canaliculata.* "*Obsoletis*" and "*primores*" were subsequent emendations.

T. ROSTRATA. *T. oblonga, antice angulato-rostrata.*

The *T. rostrata* of the final edition of the 'Systema' was assuredly the *T. Spengleri*, and with that shell solely will the printed account in the 'Museum Ulricæ' accord. But the five earlier lines of the description (save "*et albus*"), and the detailed dentition (except "*fossula distinctus*"), with the varieties *a, b, g*, and the same synonyms as in the tenth edition of the 'Systema,' appear in the MS. with the name *T. petasunculus* attached. Whether designedly or not, there was a pictorial definition of *T. vulsellæ* in the earlier 'Systema;' and if an author be not allowed to amend his description, *T. vulsellæ* is better entitled than *T. Spengleri* to the name *rostrata*. "*Margo exterior parum repandum est*" was written in the MS.

T. REMIÆ. *T. rugosa, suborbiculata.*

The expressions "*hians*," "*primores*," "*remoti*," and the last five words of the details were absent; "*utrinque*" followed "*duo*": "*non*" in place of "*vix*" was the earlier reading.

T. SCOBINATA. *T. scabra orbiculata.*

"*Primores*," and "*in altera testa profunda fossula distinctus*," were not in the copy.

CARDIUM.

Cardo dentibus baseos binis, marginis solitariis remotis acutis. Valvulæ gibbæ, hinc figura cordis.

BUCARDIUM was the epithet applied in the written copy to the members of this genus, to which the *Solen bullatus* of the 'Systema' was correctly referred. *Macra* had not then been separated.

C. COSTATUM. *Buc. sulcis costis elevatis membranaceis.*

The original description has been somewhat enlarged in the press, by the addition of "brevissimis," "et extrorsum flexis," "fossula distinctus; at vero ille sub ano quasi duplex": "minus vero ad latera sulcata," moreover, was simply "ad alterum latus": the only expression omitted in printing was "reflexus," which followed "Anus margine."

C. CARDISSA. *Buc. compressum, valvis carinatis, natibus contiguis.*

"Colum. Aqu. 19. t. 16" (cited also in the 'Systema') was quoted in the MS. from which the "vix," "subcontigui," "remotus, validus, fossula distinctus," were absent. The "Rima" was termed "subrotunda" instead of "cordata."

C. HEMICARDIUM. *Buc. subquadrilaterum: valvulis carinatis, umbonibus distantibus.*

"Fasciis" was a misprint for the original "facies": "sulcis convexis" was written "sulcis excavato-rugosis." There was no specific appellation.

C. MEDIUM. *Buc. subcordatum subangulatum; valvulis angulatis sulcatis lævibus.*

The prefatory remarks were the only portion of the printed description to be found in the MS. The species was not named, but was quoted in the 'Systema' before the publication of its details.

C. ACULEATUM (misprinted "muricatum"). *Buc. subcordatum, sulcis convexis, linea cava exaratis, versus apicem dentatis.*

The intended name was *verum*.

C. ECHINATUM. *Buc. subcordatum, sulcis acutis exaratis linea elevata ciliata aculeis inflexis plurimis.*

"List. Aug. 188. t. 5. f. 33, Pectunculus echinatus," "Bonan. 2. t. 90," "Gesn. Aq. 131, 132," "Faun. Succ. 1339," "Rondel. Aq. 22," were the original synonyms, to which our author had subsequently added "Klein, 139. t. 10. f. 40." "Alba" followed "gibba"; "parum antrorsum inflexis" was the reading for the printed "erectis subulatis"; "extrorsum" for the "uti extus": "brevioribus. Anus lævis, sutura simplici prominula," "recurvi," "fossula distinctus," were emendations.

C. TUBERCULATUM. *Buc. subcordatum, sulcis obtusis nodosis transversim striatis.*

"Gualt. t. 71. f. m." was a correct additional synonym.

C. ISOCARDIA. *Buc. cordatum, sulcis imbricatis squamis fornicatis.*

"Klein, 138. isocardia fragum" had been interpolated by Linnaeus; hence the name, which was not in the original. The "fossula distincti" has replaced the earlier "validi."

C. FRAGUM. *Buc. subcordatum subangulatum, sulcis notatis semicirculis elevatis.*

By the addition of "mala" to the erroneously cited figure of Gualtieri, our author has virtually repudiated it. "Spinose" followed "Pruni;" the fallacious "s. rubris" was not present, nor "sæpe" either; "antere" stood in the place of "postico," and "postico" in that of "antico." The

descriptions of the "rima" and "anus" have been added: "recurvati" and "fossula distincti" were amplifications.

C. UNEDO. *Buc. subcordatum, sulcis lunulis coloratis.*

C. MURICATUM. *Buc. subrotundum sulcatum, lateribus muricatis.*

C. MAGNUM. *Buc. oblongum, sulcis angulatis latere serratis.*

I had hoped to have found the 19 a misprint, but the MS. and the printed copy agree precisely in every particular.

C. FLAVUM. *Buc. subovatum sulcatum, latere altero scabrum, altero dentatum.*

The redundant "subovata" was not in the copy, where the remark was made that the species resembled the shell subsequently termed *Chama cor*, the figure of which (Gualt. t. 71. f. E.) had been cited, but erased in the MS. The ideal hence derived is a very different shell from the one supposed identical. No mention is made of lateral teeth: was it then a veritable *Cardium*?

C. LÆVIGATUM. *Buc. ovatum, striis læviusculis longitudinalibus.*

I do not consider this (the *B. striatum* of the MS.) to be identical with the *C. lævigatum* of the 'Systema.'

C. SERRATUM. *Buc. ovale læve, antice serratum.*

"Ovata" stood in the place of the printed "obovata": "curvatus" and "parvi" were subsequent to the MS.

C. TRISTE. *Buc. ovatum læve, rima anoque obsolete striatis.*

The 'Museum' was referred to for this shell previously to the publication of the details. Curious to relate, the species was wholly omitted in the twelfth edition of the 'Systema.' It was, in all probability, a *Mastra*, which genus had not been constituted at the period when the description of *C. triste* was issued.

C. PECTINATUM. *Buc. subcordatum, striis hinc longitudinalibus, illinc transversalibus.*

The erroneous reference to Gualtieri was not present in the written copy.

Mention was made in the 'Systema' of a *Solen bullatus*, for a more detailed account of which the reader was referred to the 'Museum Ulricæ.' No such species appeared in the published edition; but the omitted shell (a veritable *Cardium*) was thus described in the unprinted version:—

BUC. BULLATUM. *B. subrotundum, antice crenato-hians.*

Rump. 143. t. 44. f. N. *Pecten bullatus.*

Testa subrotunda, inflata, gibba, fragilis, pellucida, substriata, rufo nebulosa, antice hians, margine serrato. Umbones tumidi, obtusi, reflexi. Rima minima brevissima. Ani regio obsoleta. Dens cardinis fere unicus, minimus. Marginales solitarii, remoti, compressi, majores.

DONAX.

TRUNCULUS was the proposed name of this genus, which was thus characterized:—

Testa compressa, antice obtusissima, retusa. Cardinis dentibus 2, marginis unicus.

D. SCORTUM was wisely omitted.

D. PUBESCENS. *Trun.* antice spinis ciliatus.

D. RUGOSA. *Trun.* antice rugosus, marginibus crenatis.

The printed "cuneiformis" has replaced the earlier "majuscula"; and "crenulatis" was originally "undulatis." "Intus subviolacea est" was not in the written copy.

D. TRUNCULUS. *Trun.* antice lævis, marginibus crenatis.

The reference to Klein was not in the original, but "d'Arg. t. 25. f. L." was quoted (as in the twelfth edition of the 'Systema'). The last seven words printed were not in the copy. The intended name was *gibbus*.

D. CUNEATA. *Trun.* cuneiformis, marginibus integerrimis.

The final remark was not in the copy, where "parva, ovata," preceded "cuneiformis." The then unpublished details were quoted in the 'Systema.'

D. SCRIPTA. *Trun.* ovatus lævis scriptus.

The erroneous citation of Gualtieri (a misprint for 88. f. Q.) was not in the copy, and, as the figure represents the *D. trunculus* in the page opposite, I suspect was carelessly placed here by the printer, when our author had inserted it in his revised proof. I suspect this error often occurred, as for instance in *Tellina planata* and *radiata*, where Gualtieri's figure (added during revision) was attached to the former instead of to the latter. "Margo interne crenulatus," and nearly the entire account of the teeth, were emendations.

D. MURICATA. *Trun.* ovatus, striis muricatis, margine denticulato.

"Postice solitarii" followed the final "utrinque": "primores" was an emendation.

VENUS.

This genus (as a whole) was not to be found in the manuscript System. Its components were distributed into three groups, two of which bore names that were subsequently allotted to forms very remote from those therein so designated.

CUNNUS. Testa subrotunda. Rima nymphis instructa. Dentes cardinis 4, lateralibus divaricatis versus latera. This contained the bulk of the *Veneres*, all except Nos. 63, 66, and those referred to *Pholas* and *Chama*.

PHOLAS. Testa lenticularis. Rima fissa, destituta nymphis. Dentes cardinis 1 s. 2, marginalis tantum intra anum. *V. Pennsylvanica*, *incrassata*, *punctata*, *edentula*, *exoleta*, *scripta*, *pectinata*, *ziczac* were its constituents.

CHAMA. Testa ovalis cum angulo. Cardo dentibus 4 confertis, quorum unus in singula valvula bifidus. In this were located *V. literata*, *rotundata*, *decussata*.

V. DIONE. *Cun.* cordatus, antice pubescenti-spinosus.

The same references to Petiver, Olearius, and Lister were present as in the 'Systema.' The final remark was an addition. The proposed name was *C. Veneris*.

V. MARICA. *Cwm. subcordatus, decussatim striatus, pube lamellosa.*

V. DYSERA. *Cwm. testa subcordata, sulcis transversis reflexis, labiis concavis incumbentibus.*

Neither "Huic rugæ, &c.," "lævis," nor the synonym of Lister were in the original.

V. CHIONE. *Cwm. subovatus, lævis.*

The erroneous reference to d'Argenville was not inserted in the MS., from which "lanceolatis," likewise, was absent.

V. MACULATA. *Cwm. testa ovato-cordata lævis.*

"Lanceolata" and "ovato-oblongus" have been additions. The observation that it was difficult to distinguish this shell (which was not named in the MS.) from the following, would mislead one, since the remark referred to two unpublished species, which it originally preceded.

V. MERETRIX. *Cwm. subcordatus glaber, labris gibbis, nymphis apice hiantibus.*

C. vulgatus was the name originally designed.

V. CASTRENSIS. *Cwm. suborbiculatus glaber, characteribus scriptus.*

V. MEROE. *Cwm. sutura postica hians.*

V. FIMBRIATA. *Cwm. subrotundus decussatus rugosus, longitudinaliter striatus.*

D'Argenville was not referred to.

V. RETICULATA. *Cwm. subcordatus, striis crenatis decussatis, ano cordato.*

V. TIGERINA. *Cwm. suborbiculatus, striis crenatis decussatis, ano ovato.*

The name was an error, having been derived from the "Lingua tigerina" of Rumphius (his figure G., not H.): *fuliginosus* was the one originally intended.

V. PROSTRATA. *Pho. orbiculata, transverse striata, labiis scabro-membranaceis.*

The unpublished details had been previously referred to in the 'Systema.'

V. PENNSYLVANICA. *Pho. glabra, rugosa, antice sulco longitudinali.*

"Habitat in Pennsylvania," and "subdiaphana," were the unprinted additions. The "margo interne crenatus," "nates sub-recurvatæ," and "color intus versus marginem violaceus," were not in the copy. The last character (so utterly inappropriate to the features of *Lucina* P.) was, I suspect, intended for *punctata* on the page opposite.

V. INCRUSTATA. *Pho. glaberrima lævissima, punctis excavata.*

The details were referred to in the 'Systema' before their publication.

V. PUNCTATA. *Pho. longitudinaliter sulcata.*

The G in the reference to Rumphius was a misprint for the written D, from which figure ("Chama pectinata") our author had proposed to borrow the specific name, but subsequently had preferred the published designation. "Klein, 147. *Actinobolos sequilatera*" has been added to the MS. by Linnæus.

V. EXOLETA. *Pho. decussatim striata.*

The original synonymy and details have been so transmuted in the press, that it is manifest that the amended (!) species was perfectly distinct from the shell originally designed. The name of the latter was *clathrata*, and the declared sculpture was not merely "transversim," but "et longitudinaliter" likewise (in place of "striis retrorsis"). The reference (added by Linnæus) was not to Gualtieri, but to Lister, 335, f. 172, and its copy in Klein (t. 10. f. 52), both which would have more appropriately been assigned to *V. reticulata*. The *V. exoleta* having been previously defined in the 'Systema,' this confusion becomes of little importance.

V. ZICZAC. *Pho.* striis transversis membranaceis erectis.

The number which indicates the position of this species in the 'Museum' has been subsequently ('Syst.' ed. 12) referred to *V. cancellata*, yet, judging from the generic appellation (and consequent dentition), it could scarcely have been that well-known species. The "lenticiformi" of the 'Systema' (ed. 10), where the name *ziczac* first appeared, forbids the annexation; but, although the details of the 'Museum' were there referred to, the obnoxious word was not mentioned in that publication. The following are the printed emendations (?): "lævis, et quasi excisa," "compressa," "variat colore albisimo."

V. PECTINATA. *Pho.* sulcis longitudinalibus nodosis, antice antrorsum ramosa.

The additional synonym of "Gualt. D. 75, f. A." appears in the MS., where "quam reliquæ" follows "orbiculata," and in place of "In area antica" may be read "et a primo sulco." The details there terminate with the word "lanceolatum." "*Ramosa*" was the intended name.

V. SCRIPTA. *Pho.* striata, postice angulo recto circumscripta.

The incorrect figure of d'Argenville was not indicated.

V. EDENTULA. *Pho.* subgloboso-lenticulata rugosa edentula.

V. LITERATA. *Cha.* transversim striato-ovata.

The earlier reading of confertim was "profunde"; "striis crenulatis antice et postice," "lanceolata," and "tres s." were absent.

V. ROTUNDATA. *Cha.* transversim striata ovata absque angulo.

The printed additions are "varius in variis," "aut albis," "lanceolata," and the final remark. There was no name attached in the MS.

V. DECUSSATA. *Cha.* testa ovata, decussatim striata.

"Sæpe" and "minimus" are the sole printed additions.

Probably the *V. Phryne* of the 'Systema' was designed by the following unpublished description:—

CUN. VENOSUS. *C.* subcordatus lævis lateribus rugosis. Testa cinerea, nuce coryli major, gibba, glabra, antice et postice transversim sulcata. Margo exterius tantum denticulatus, non vero apex externus, aut margines laterales.

The *V. macrodon* answers fairly enough to this definition.

SPONDYLUS.

This very natural genus was confused with *Chama*, and thus characterized :—

Testa imbricata. Cardo e callo gibbo oblique inserto fossula obliqua.

S. GÆDEROPUS. S. imbricatus auritus, cardine dentato.

"Rumph. t. 48. f. 1," "Gualt. t. 99. f. E. F. G," "Bonan. 2. f. 21," "Rondel. c. 40. p. 41," were the additional synonyms of the MS. The "ad cardinem truncata" was an emendation for the previous "breviore": the "superiore" a misprint for the written "inferiore": the final remark was not present.

S. REGIUS. S. spinosus sulcatus inauritus, cardine dentato.

No name was attached to this species: the previous one had been termed *Pectinites*.

S. PLICATUS. Not mentioned in the manuscript.

CHAMA.

The members of this genus were included in *Spondylus*, except *cordiformis*, which was referred to *BUCARDIUM*.

C. GIGAS. Sp. plicatus squamosus, ano hiant e crenato.

The species as originally defined was more comprehensive in its details than when printed; for the restricting "decussatim" had not been added, and "Gualt. t. 93. f. B." was an additional synonym. The printed additions were "obsoletis," "Margine reflexo," "exteriore duplicato longiore," and the final remark. *S. imbricatus* was the intended name.

C. HIPPOPUS. Sp. plicatus muricatus, ano retuso clauso dentato.

"Arg. t. 26. f. H." was an additional synonym of the MS.: the printed 20 should have been 10, as written: "ut in præcedente" was an emendation: *S. asper* was the proposed name.

C. LAZARUS. Sp. imbricatus.

Seba was not cited: "obliquam" followed "fossam" in the MS. "Elevatis," "longitudine testæ," "productiore," "instar auris," formed no portion of the early description.

C. ANTIQUATA. Sp. subcordatus, sulcis perpendicularibus transversim striatis.

No name was attached to the original details, which appear to have been altered ("in aliis minimum cordatum impressum fuscum"), and the synonym of Bonanni added, in order to comprise that species (*Cardita sulcata*) which had been pictorially defined in the 'Systema.' "Gibba" was preceded by "admodum": "obsoletis" was not present. *Cardita bicolor*, var. *unicolor* was probably intended.

C. SEMIORBICULATA. Sp. semiorbiculatus compressus, decussate striatus, rudis.

"Interior" was the earlier reading of "primarius."

C. CORDATA. Sp. cordatus, transversim striatus, hinc elongatus, compressus.

- C. OBLONGA. *Sp. oblongus, antice angulatus, dentibus anticis acutis.*
 "Unico" (error for "unicus") originally preceded "in altera valvula."
 C. CORDIFORMIS. *Buc. subrotundum læve, umbonibus recurvatis.*

The brief description in the 'Systema' had evidently been copied in the manuscript by our author himself, who cited Gualt. t. 71. f. E. as the sole synonym. The specimen had apparently been added to the collection, subsequently to the drawing up of the first catalogue.

ARCA.

Testa crassa, umbonibus distantibus intus fornicatis. Cardio planus, masticatus dentibus numerosis minimis æqualibus transversis.

- A. TORTUOSA. *A. oblonga obliqua, valvula altera oblique carinata.*

"Nates, &c." and "Cardo, &c." were the printed additions to the earlier description. The 'Systema' synonyms of Klein (t. 8. f. 16) and Bonanni (2. f. 128) were present in the manuscript.

- A. NOÆ. *A. oblonga angulata hians.*

This manuscript furnishes us with the additional synonyms of

"Aldrov. 3. p. 513." and "Sloan. Hist. 2. p. 257. *Musculus Matthioli*," besides the previously published references to Lister (368. n. 208) and Bonanni (2. t. 32). The formation of the hinge was not, however, indicated, and the passage commencing with "Nates" has been enlarged from "*Umbones remotissimæ, area interjecta concava, ad angulum rectum striata. Margo exterior in medio hians, apertura barbata.*"

The intended specific epithet was *A. Noemi*.

- A. ANTIQUATA. *A. testa oblique cordata, transversim sulcata, antice angulo compresso, rima intra rhombum transversim striata.*

The admixture of two species (at the least) in the published edition resulted from the amalgamation of two earlier descriptions. To the above diagnosis belonged the printed details with the following important changes. In place of "*extus striata longitudinaliter sulcis crenatis*," the reading was simply "*intus striata longitudinaliter*," and in lieu of "*interjecto spatio rhombeo plano*," merely "*rima patens*."

The proposed name for this shell, from a supposition of its identity with the *Pecten virgineus* of Rumphius, was *A. virginea*. The other species which Linnæus referred to the same numerals of the 'Systema' was not named, but was thus characterized:—

- A. (Sys. n. 144). *A. cordata, sulcis nodosis, rima decussatim striata.*

List. Hist. *Pecten polypleptoglymus, &c.*

Gualt. t. 87. f. C.

Testa reliquis magis gibba, albido-flavescens, sulcis xxx obtusis, transversim nodosis: nodis transversis, obtusissimis, imbricatis. Intus albida. Margo dentibus xxx argutiusculis. Rima sulco rhombeo circumscripta, disco decussatim vix manifeste striato. Umbones distantes ad neutrum latus flexi.

- A. SENILIS. *A. oblique cordata, octosulcata, lævis, antice hians. rima obtusangule striata.*

Lister (without numerals!) was referred to in illustration; the early unimproved account of the beaks and ligamental area ran as follows: "Umbones distantes, oblique incurvati. Rima hians striata transversim ad angulos acutos": "et profunde immersis" was an addition.

A. GRANOSA. *A. subcordata, sulcis muricatis, rima obtusangule striata, utrinque angulum formante.*

The name was evidently borrowed from Rumphius, whose *Pecten granosus* ("143. t. 44. f. K.") was referred to in the manuscript, though neither quoted in the printed copy nor in the 'Systema' (ed. x.). "Bonan. 2. n. 73," and Lister (without numerals) were also cited.

A. DECUSSATA. *A. lenticularis, decussatim substriata, apicibus reflexis.*

For a detailed account of this shell, to which no specific name was attached in the MS., the 'Museum Ulricæ' was referred to, previous to its publication.

A. PALLENS. *A. lenticulari-subobliqua, decussatim striata, rima brevi.* This was the type referred to in the 'Systema.'

A. PECTUNCULUS. *A. lenticularis sulcata, decussatim rugosa.*

"Arg. t. 27. f. B," and Lister without numerals appended, were the unpublished synonyms. The expressions "leviter," "exteriore tenui; sulcata," "in arcum," were not parts of the original copy, which contained, however, the unprinted paragraph "latere interiore margine prominente notato." There was no specific name attached to either this or the next species.

A. GLYCIMERIS. *A. lentiformis, transversim substriata, rima lævi.*

The '*Chama glycimeris Bellonii*' of Lister (t. 247) was an unprinted synonym.

The following suppressed description of an unnamed Ark that was allied to, if it were not, *fusca* or *barbata*, was found in the manuscript. The 'Museum' had been referred to in the synonymy of the latter in the 'Systema,' but the species was not mentioned in the published version.

Arca ovalis, compressiuscula, apicibus subcontiguus.

Testa rudis, ferrugineo-fusca, longitudinaliter striata, striis quasi ex punctis callosis concatenatis, alternis striis majoribus ovatis, parum obliquis, minus lateribus gibba, rotunda absque angulis. Margo æqualis, edentulus. Apices recurvi fere tangunt se invicem. Rima dentibus minutissimis, antice longius extensa, nec recta.

OSTREA.

The very natural genus *Pecten* was separated from the unsymmetrical oysters, with the following definition:—

PECTEN. Testa subrotunda, altera planior, basis transversa, anguli transversi (auriculæ) ad basin. Cardo cavitas conica, striis utrinque 3 longitudinalibus obliquis.

The genus OSTREUM, enlarged by the addition of the true oysters confounded with the *Mytili*, the *Meleagrinae*, *Aviculae*, and the *Anomia placenta*, was thus characterized:—

O. MAXIMA. Pec. radiis 14 rotundatis longitudinaliter striatis.

In place of Gualtieri, "List. Ang. 184. t. 5. f. 29. Pecten maximus," and "Faun. Suec. 1343" were referred to: these synonyms had been added subsequently to the description.

O. JACOBÆA. Pec. radiis 14 angulatis, fornicis longitudinaliter striatis. The cited drawing of Gualtieri was not mentioned.

O. ZICZAC. Pec. radiis 18 explanatis.

No specific name was attached to this, the preceding, and the next two species.

O. STRIATULA. Pec. radiis 16 oblitteratis, transverse membranaceo-striatis, margine integerrimo.

O. MINUTA. Pec. radiis 20 convexis.

O. PLEURONECTES. Pec. radiis 12 duplicatis, extus lævis.

O. OBLITTERATA. Pec. radiis 24 duplicatis, extus lævis.

O. RADULA. Pec. radiis 6 convexis decussate striatis, margine crenato, auriculis aequalibus.

O. PLICA. Pec. radiis 16 convexis læviusculis, decussato-striatus.

No specific name was appended to either this, the next, or the two preceding species.

O. PALLIUM. Pec. radiis 12 convexis, striatus, scaber, squamis imbricatus.

This with the remainder of the *Pectens* (as far as *flavicans*) formed a group characterized by "Auricula altera intus ciliato-spinosa."

O. NODOSA. Pec. radiis 9 nodoso-vesicularibus.

O. PES-FELIS. Pec. radiis 9, lævis, fornice squamis fornicatis.

The printed diagnosis, or heading, was evidently drawn up from a different shell.

O. PELLUCENS. Pec. radiis 9, lævis, fornice squamis cochleari-hemisphaericis.

No name was attached to this or the next shell.

O. SANGUINEA. Pec. radiis 22 scabris, semiauritus.

The reference was not to plate 74 (as printed) of Gualtieri, but to plate 73. "Purpureus nigro undatus" was written after the indicated colouring.

O. VARIA. Pec. radiis 30 scabris explanatis.

"Et omnia eadem" followed "sanguineæ"; "striis compressis echinatis" was not present; "color pallidior" was in the place of "concolor."

O. PUBIO. Pec. radiis 40 filiformibus.

O. GLABRA. Pec. radiis 10 lævibus planiusculis, internis striis elevatis duplicatis.

Gualtieri's rude drawing was not quoted.

O. OPERCULARIS. Pec. radiis 20 subrotundis, decussate striato-scaber, operculo convexiore.

O. GIBBA. Pec. radiis 20 glabris, gibbus.

Brown's drawing was not quoted.

O. FLAVICANS. Pec. radiis 8 striatis, margine altero rotundato.

As in the 'Systema,' the next two shells, along with this, formed a group distinguished as having the "Valvulis altero latere magis gibbis." No

names had been appended to this, the three preceding, and the two following species.

O. FASCIATA. *Pec. radiis 20, auriculis aequalibus exoletis.*

The "gibba" of the borrowed diagnosis was not, it may be observed, in the original.

O. LIMA. *Pec. radiis 22, imbricatis squamis, altero margine rotundato, auriculis oblitteratis.*

The "gibba" of the borrowed heading was not in the original diagnosis. The final remark was likewise absent.

O. ISOGNOMON. The entire account of this species was added to the copy in the Linnean handwriting. "Klein, 128. t. 8. f. 15. *Isognomon*" and "Cardo ut ephippo" had been omitted in printing.

O. MALLEUS. *O. trilobum.*

"Transverso ad marginem" was a subsequent addition.

O. FOLIUM. *O. ovatum, lateribus obtuse plicatum.*

Klein's copy (t. 8. f. 22.) of the indicated figure in Rumphius was cited, in the handwriting of Linnæus: "the "cavitate conica" was an emendation.

O. EDULE. *O. subrotundum semiorbiculatum, valvula altera plana integerrima.*

There was no semicolon after "opaca," but a comma after "latiore." The original sole synonym was the omitted one of "Gualt. t. 102. f. B."

O. SEMIAURITUM. *O. semiauritum ovatum læve, basi obliqua.*

Linnæus himself had added this species to the earlier catalogue.

O. EPHIPPIUM. *O. submembranaceum curvum, cardine octosulcato.*

In addition to the published *Ostreæ*, the following description of the shell subsequently termed *O. perna* (Syst. ed. 12.) was found in the manuscript:—

O. rugosum, inaequale, tumidiusculum, cardine octocrenato.

Testa perniformis, obovata, substantia ligni antiqui, tumidiuscula, superficie obsolete rugosa, inaequali, interne livida. Cardo transversus, margine inflexo, notatus crenis obtusis circiter 8.

ANOMIA.

The single species here mentioned was comprehended in *Ostreum*.

A. PLACENTA. *O. orbiculatum planum pellucidum.*

Reference was made, by a long periphrasis, to plates 225, 226 of Lister's 'Historiæ'; Seba was not quoted: "intra discum testæ adnatis" was absent.

MYTILUS.

Testa opaca, læviuscula. Cardo nullis dentibus instructus, sed fossula obliqua intra marginem.

This definition very properly excluded the oysters which had been erroneously inserted in this genus. Only the *Mytili* and *Modiolar* of Lamarck were left as members; for *margaritiferus* and *hirundo* were transferred to *Ostreum*!!

M. FRONS. *Ost. acutum plicatum, labio altero scabro.*

M. CRISTA-GALLI. *Ost. acutum, plicatum, labio utroque scabro.*

The reading of the MS. was not "secundum marginem insculptus," but "secundum marginem Mytilus."

M. HYOTIS. *Ost. subacuto-plicatum imbricatum squamis compressis, labio utrinque glabro.*

M. MARGARITIFERUS. *Ost. semiauratum, imbricatum tunicis, basi transversum.*

"Bonan. 2. f. 1." was the omitted synonym. The description of the hinge was not at first inserted.

M. UNGUIS. *M. subrotundus, longitudinaliter striatus, pellucidus.*

This ambiguous species was not named, but placed next to *Ostrea edulis*. I entertain but little doubt of its being a young *Perna*.

M. LITHOPHAGUS. *M. cylindricus.*

Neither Gualtieri nor d'Argenville was referred to, which confirms my idea that the species of the 'Museum' (termed *coriaceus* in the manuscript) was not the Mediterranean *Lithodomus*.

M. BILOCULARIS. *M. striatus, cardine fornicato.*

M. EXUSTUS. *M. striatus, dorso angulato.*

M. EDULIS. *M. lævis, subcurvatus, cardine terminali mutico.*

The printed synonyms are additions. From the "crassa," and the "absque denticulo," it is by no means improbable that some large exotic species was intended. The proposed name was *niger*; and that word originally formed part of the heading, but had been erased by Linnæus.

M. UNGULATUS. *M. læviusculus, valvis obliquis postice dilatatis, antice apice.*

"Lineis" was "tunicis" in the original. I do not consider that the details of this species (the *M. rusticus* of the MS.) pertain, even generically, to the *ungulatus* of the 'Systema.'

The large *Mytilus* represented by Gualtieri was not quoted: the reference, on the contrary, was to the two *Modiola* depicted by Rumphius ("Rump. 151. t. 46. f. B. C.") and to their Kleinian names ("Klein, 127. *Musculus acutus vulgaris*, a. b."); and to that genus, rather than to *Mytilus*, does the account of the suture, and the final remark, apply.

M. MODIOLUS. *M. lævis, cardine sublaterali, margine dorsali dilatato.*

The erroneous, yet approximate, synonyms of Rumphius and Gualtieri (the 4 H's of whose engraving represent 4 different shells) were not quoted in the original. The species (for want of a good figure) was not clearly defined until the twelfth edition of the 'Systema.'

M. VIRIDIS. *M. lævis membranaceus, cardine terminali.*

M. RUBER. *M. rugosus, valvulis obliquis, postice dilatatis, margine antico apicem æquante.*

The preceding mussel spoken of was not *viridis*, but *ungulatus*. The reading was not "brevissimo, compresso," but "brevissime compresso."

M. HIRUNDO. *Ost. valvis bilobis, lobo anteriore angustiore longiore.*

"Bonan. 2. f. 57" (error for 58) and "List. 220. f. 55" were quoted

PINNA.

The definition was not precisely similar in words to that of the 'Systema,' but the sense varied but little. It ran as follows:—

Testa oblonga, membranaceo-fragilis, basi angustata. Cardo nullus, sed valvis altero latere coadunatis ut una appareat.

P. RUDIS. P. rugosa squamis fornicatis per seriem digestis.

The name of this shell, identified (I think wrongly) by our author with the one he had termed *rudis* in the 'Systema,' was originally *fornicata*.

P. NOBILIS. P. squamis canaliculato-tubulosis subimbricatis.

P. MURICATA. P. striata, squamis concavis ovatis acutis.

"List. Hist. t. 370. no. 215," and "Sloan. Hist. i. p. 254," were present among the original synonyms.

P. ROTUNDATA. P. squamis obsolete, testæ margine rotundato.

P. SACCATA. P. nuda saccata erectiuscula.

P. DIGITIFORMIS. P. nuda digitiformis incurva.

P. LOBATA. P. nuda lobata.

In addition to the printed species, an anomalous *Pinna*, which I doubt not was the *Lingula anatina*, is here described.

P. VIRIDIS. P. ovalis, basi compressa.

Generis dubii huc relata, donec certiora determinentur.

Testa utraque ovali-oblonga, viridis, intus magis pallida; quasi compressa, et fere naviculata, acutior.

ARGONAUTA.

The intended name of this genus was *Cymbium*, the one applied to it by Gualtieri.

A. ARGO. Cym. carina dentata.

"Bonan. 1. f. 13," and "Klein, 3. t. 1. f. 3," were the unprinted synonyms. The intended specific epithet was *C. papyraceum*.

NAUTILUS.

There was no definition of either this, or of the preceding genus, in the written catalogue.

N. POMPILIUS. N. apertura cordata, anfractibus contiguus.

The unprinted synonyms were "Bonan. 1. f. 1, 2," "Breyn. Polyth. 14," "Pet. Amb. t. 3. f. 7," "Pet. Gaz. t. 99. f. D," "Klein, 2. t. 1. f. 1, 2," and "Bellon. Aquat. 318. t. 382." Seba was not quoted.

N. SPIRULA. N. apertura orbiculari, anfractibus distantibus.

The I in the reference to Rumphius was a misprint for the written l; "Bon. 1. f. 39," "Breyn. Polyth. 21. f. 2," "Klein, 5. t. 1. f. 6," and "Petropol. Mus. 532. n. 6," were the unprinted synonyms: "tubo" was an emendation.

CONUS.

Testa oblonga, cylindrica, deorsum attenuata. Apertura longitudinalis. Labium edentulum. Os non reflexum. Columella integra.

This most natural genus had the precise limits ordinarily assigned to it.

C. MARMOREUS. C. conicus fuscus, maculis ovatis albis.

"Bonan. 3. f. 123" was an additional synonym; the "versus basin transversæ striata," and "subtruncata, apice prominulo," with the account of the variety, were not found in the MS.

C. IMPERIALIS. *C. pictus fasciis flavis cingulisque linearibus albo fuscoque articulatis.*

The "obconica" was simply "conica"; there was no description of the spire.

C. LITERATUS. *C. conicus albus punctis fuscis.*

The spire was not described: the reference to d'Argenville was I, not Q.

C. VIRGO. *C. striis convexis lævibus, basi cærulescente.*

"Longa" was originally "magna": the erroneous reference to Gualtieri was not inserted.

C. CAPITANEUS. *C. conicus, basi fusca, spiræ anfractibus ascendentibus.*

At least two species were confused; but, from the heading, it is clear that *C. generalis*, rather than *C. capitaneus*, was the typical form: the latter was the variety *g*.

The V in the reference to Rumphius was a misprint for the written Y: "Gualt. t. 20. f. G." and "Pet. Gaz. t. 27. f. O." were additional synonyms. "Notata lituris undatis fuscis" was not in the manuscript.

C. PRINCEPS. *C. flavus, lineis fusco-purpureis longitudinalibus ramosis.*

"Sub" preceded "convexa."

C. AMMIRALIS. *C. basi punctato-scaberr.*

After "summus" was written "cingulo albo"; after "ordinarius," "cingulo nullo"; Seba was not quoted; "pruniformis" was the earlier reading for "conico-convexa, pyriformis." The variety *a*. was described as "circumdata lineis numerosis albis nigro articulatis, quarum quæ cylindrum distinguit a spirâ latior maculis albis nigrisque majoribus alternantibus." The variety *g*. was not originally present in the catalogue, but was interpolated by Linnæus. "Hæc pretiosissima ut vendita fuerit 500 florenis" was the final remark.

C. NOBILIS. *C. subcylindricus lævis glaber, spirâ acuta argute canaliculata.*

"Cacumen" was a misprint for the written "acumen."

C. GENUANUS. *C. pictus cingulis linearibus albo fuscoque articulatis.*

A strange confusion took place between the details of *C. senator* and *C. Genuanus*. The published description belonged to the former, the synonym to the latter, and should have preceded the following brief description:

"Testa conica, pallida, glauca, oblongiuscula. Lineæ 19 transversæ, fusco-nigræ s. purpurascens albe interruptæ, alternæ sæpe angustiores. Spirâ subconica, obtusa."

C. GLAUCUS. *C. emarginatus, basi striatus, spiræ inermis anfractibus convexis.*

C. MONACHUS. *C. gibbus acutus, fusco-cærulescente nebulosus, basi striatus.*

Bonanni was not quoted in the written copy.

C. TALPA. *C. subturbinata violacea, fasciis pallidis.*

"Pet. Amb. t. 16. f. 1." was an unprinted synonym : "*pallide flavescens*" was the earlier reading for "*testacea*." The final remark was not in the copy.

C. AMETHYSTEA. *C. subturbinata, dorso violaceo.*

Rumphius was not originally cited as illustrative.

C. VANELLI. *C. subturbinata, maculata punctis lutescentibus.*

"*Obsoletis*" was originally in the place of "*acutis*": the "*aspe lutescentibus*" was an addition of the press. *C. Ovum Vanelli* was the intended designation.

C. LOTA. *C. subturbinata alba, denticulis subulatis.*

C. FRAGILIS. *C. subturbinata gibba fragilis, obsolete fasciata.*

Linnaeus himself inserted this heading, with the first three lines of the printed details, in the manuscript copy. Neither the reference, nor the longer account of the variety (evidently a different species) appeared there.

C. CAPUT-SERPENTIS. *C. obtusa triquetro-gibba, postice obtusiuscula.*

"*Fusis*" was the earlier reading for "*confertis*."

C. MAURITIANA. *C. obtusa triquetro-gibba, postice depresso-acuta.*

"Pet. Gaz. t. 96. f. 8. ex Insula Mauriti" was added in the manuscript : "*fuscus*" was the earlier version of "*fusco-testaceus*."

C. VITELLUS. *C. subturbinata livida, maculis albis.*

The published reference was substituted for "Bonan. 3. f. 254," a more characteristic figure : "*maxima ex parte distincta, sed*" followed "*Spira*." "*Albida*," not "*alba*," was the tint at first ascribed to the base.

C. MUS. *C. obtusa subovalis gibba cinerea, fascia longitudinali fusca.*

Our author himself inserted the account of this species in the manuscript. Seba was not quoted. "*Habitat in Carthagena*" was appended to the description.

C. TIGRIS. *C. obtusa ovata, postice obtusa.*

In the synonym of Rumphius, 36 is a misprint for 38: the erroneous reference to the H of Gualtieri was not in the copy, where "Pet. Gaz. t. 96. f. 7" was indicated as illustrative. The printed additions were "*aut alba*," "*fusco-ferrugineis*" (in lieu of "*fuscis*"), and "*s. alba, quasi exarata; postice subcylindrica, truncata*"; the previous words "*Linea, &c.*" of that sentence were also absent from the original description, but had been inserted by the hand of Linnaeus. "*Postice*" preceded "*planiusculo*," and "*subviolaceo*" followed "*nitore*."

C. LYNX. *C. oblongo-ovata, linea flavescens, postice acutiuscula.*

No variety was mentioned in the written copy.

C. ISABELLA. *C. obtusa cylindrica, extremitatibus luteis.*

"Pet. Amb. t. 16. f. 16." was cited in the manuscript, where the final remark was wanting.

C. ONYX. *C. umbilicata, subtus fusca.*

Neither of the synonyms was quoted in the copy.

C. SUCCINCTA. *C. umbilicata, labio interiore utraque extremitate rotundato.*

The entire account of this shell (the *C. bicincta* of the MS.) was added to the copy by our author.

C. ZICZAC. *C. umbilicata*, subtus lutea punctis fuscis.

None of the cited figures were referred to in the original, where "interiore" stood in the place of the printed "utroque fusco."

C. HIRUNDO. *C. umbilicata*, supra cærulescente.

"Sparsis", "s. fusca", "necnon macula, &c." were emendations of the press: "postice" preceded "fere marginato" in the original.

C. ASELLUS. *C. umbilicata* alba, fasciis tribus fuscis.

"Pet. Amb. t. 16. f. 18." and "Pet. Gaz. t. 97. f. 11." were cited in the copy as illustrative.

C. CRIBRARIA. *C. umbilicata*, maculis albis.

"Margo" preceded "adscendens" in the copy, in which "livide flavo" was found in place of "luteo": "flavicantibus" was omitted. The intended name was *C. Argiolas*.

C. ERRONES. *C. umbilicata*, macula testacea æquali.

Erratica was the original specific appellation.

C. MONETA. *C. marginata-nodosa*.

"Pet. Gaz. t. 97. f. 8." and "Pet. Amb. t. 16. f. 8." were omitted in printing; "subflavescente" followed "convexo"; "subtus planiuscula" and "incisis" were absent. In place of the final remark (added, however, by the hand of our author), there originally stood "Noscitur tuberibus quinque elevatis."

C. ANNULUS. *C. marginata* annulo flavo.

The "s. rotundata" was added in printing.

C. EROSA. *C. marginata* flava albo-punctata.

"Undique aspersa" and "Macula fusca notat medium utriusquelateris" are the printed emendations.

C. HELVOLA. *C. marginata*, postice crenata, subtus flava immaculata, supra albo punctulata.

The final remark was unwritten, and the size not mentioned: "marginis gibbi" was "margine exteriore gibbo", and "subcrenati" was "latere subcrenato."

C. STOLIDA. *C. marginata* variegata cinereo testaceoque.

"Quinque" and "adspersis" were not in the original.

C. OCELLATA. *C. marginata* lutea, ocellis nigris.

C. FLAVEOLA. *C. marginata* fulva, albo punctata.

C. PORARIA. *C. marginata* subviolacea, albo punctata.

C. PEDICULUS. *C. transversim* sulcata.

"List. 168. t. 3. f. 17." and "Barr. t. 1326. f. 28." were cited in addition to the printed synonyms. The last four words of the description were not in the copy.

C. NUCLEUS. *C. sulcata* punctata tuberculis, rostrata.

"Pet. Amb. t. 16. f. 11." was cited as illustrative.

C. STAPHYLÆA. *C. punctis* elevatis sine striis, subrostrata.

The printed "minus" has been substituted for the earlier "vix";

"lutea" for "flava"; and "totam basin" for "maximam partem bascos."

C. GLOBULUS. C. rostrata lævis.

The printed additions were "alba s.", "extremitate utraque" (in place of "postice"), "Superficies punctis vix manifestis notata", and "excurrentes in strias".

BULLA.

Testa subrotunda, inflata, lævis. Apertura oblonga, non utrinque dentata. Spira obsoleta. Columella obliqua.

The *Murex ficus* and *rapa* of the printed edition were originally located in this genus, from which *Auris Mideæ*, *Auris Judæ*, and *achatina* were excluded: the two former were placed in *Morion*, the last in *Buccinum*.

B. OVUM. B. birostris, labio dentato.

"Arg. t. 21. f. A." "Pet. Gaz. t. 94. f. 7." "Pet. Amb. t. 8. f. 6." were additional references in the written copy: "magnitudine ovi gallinacei", "apice et basi producta", were emendations during the printing. The "dilatata" was originally modified by a "parum."

B. VOLVA. B. birostris, rostris elongatis striatis.

"List. t. 711. f. 63" had been added to the copy by the hand of Linnaeus. The mode of reference (not, as in the earlier writings, by sections and chapters) evinces that this addition was, in all probability, subsequent to the publication of the work.

B. VERRUCOSA. B. angulata, aucta utrinque puncto osseo.

The correct synonyms of "Arg. t. 21. f. M." and "Pet. Gaz. t. 97. f. 22." were found in the manuscript: the printed emendations were, "magnitudine ovi passerini", "uti antierius", and "granis duobus" for the earlier "punctis."

B. GIBBOSA. B. angulata, cingulo elevato.

"Bonan. 249", "List. t. 711. f. 64", "Pet. Gaz. t. 15. f. 5", were cited in the copy: "præcedentis magnitudine", "solidiorque", with the modification of "cylindrica" by a preceding "sub", were press emendations.

B. NAUCUM. B. rotundata pellucida.

The size was not at first mentioned.

B. AMPULLA. B. rotundata opaca.

The printed "nulla" replaced the earlier "descendens, nuda", and "pallido-testacea" the written "albida." The "antice, nullus vero postice" was an emendation of the press.

B. PHYSIS. B. spira obtusa, lineis crispata.

"Sæpe", "hiansque", "tenue", and the name, are not to be found in the written copy: "apicem" was the reading for the printed "ventrem, adnatum."

B. AMPLUSTRE. B. spira elevata, fasciis incarnatis.

B. PALLIDA. B. spira elevata acuta, corpore cylindrico.

So very many changes has this puzzling species experienced in the works of our author, that it has been thought advisable to transcribe the written description from the manuscript copy:—

Testa ovato-cylindrica, glabra. Spira convexo-conica, mucronata. Columella multum torta. Color lividus, longitudinaliter griseo undulatus.

This evidently was a very different shell from the four-plaited, pale pink, and often variegated specimen described in the printed copy. The description of the outer lip, the name, and the terms "solida", "hevigata, obsoletior" were, likewise, additions of the press.

B. CANALICULATA. *B. cylindrica lævis, spiras anfractibus canaliculatis.*

The entire account of this species was added to the manuscript in the Linnean handwriting.

B. ACHATINA. *Bac. glabrum, apertura integra.*

"Colum. Aphr. 18. t. 16" was the omitted synonym: "vel inæqualiter ovata" and the entire account of the base (merely described as "vix manifeste emarginata") were the printed additions.

B. AURIS-MIDÆ. *Morion ovali-oblongum, spira rugosa, labio interiore bidentato.*

Figure 122 of Klein's seventh plate was correctly quoted as illustrative: "crudæ" preceded "niger."

B. AURIS-JUDÆ. *Morion oblongus, spira lævi, labio interiore tridentato.*

B. SOLIDULA. *B. ovata opaca striata, spira elevata.*

I do not doubt, from the "ovata", that *Tornatella flammea* was the shell originally here intended; for the inharmonious account of the inner lip (as well as of the outer one) was not found in the manuscript,—from which, too, the erroneous reference to Bonanni was at first absent. The "acutiuscula" was "obtusiuscula": the "postice rotundata, antice acuta" was an improvement upon the earlier "pone gibba."

B. LIVIDA. *B. spira elevata obtusa, corpore cylindrico.*

This heading makes no mention of the columellar plication of the shell so named in the 'Systema,' and confirms my surmise of their distinctiveness. The name *livida* was not originally attached to the description, but had been added (together with "obsoletis") by Linnæus, from a mistaken identification.

There has evidently been some error in the comparison with *Voluta Caffra*. I suspect that *Conus bullatus* was meant, as the contrasting characters answer admirably. "Differt a *B. pallida* et *livida*, quod testa solida—anfractus spiræ canaliculati". This passage shows that "fragilis et spiræ anfractus obtusæ" referred to *livida*, not to *Caffra*.

VOLUTA.

Testa oblonga, subconvexa, basi emarginata, replicata in canalem rectum. Columella plicata oblique. Labio integro.

The genus appears to comprehend precisely the same members as in the published edition. They were arranged in sections exactly corresponding with the Lamarckian genera of *Oliva*, *Voluta*, *Mitra*, and *Marginella*.

V. PORPHYRIA. *V. spira basi oblitterata, labio medio retuso.*

Linnaeus spoilt his excellent earlier description by his attempted emendations. The interpolated "*Faux saepius rufescens*" (misprinted *virascens*), and the reference to Gualtieri's figure O. (*O. erythrostoma*), formed no part of the original version.

The "*Varietas fere sola est V. Olivæ*" was an afterthought.

V. OLIVÆ. *V. spiræ basi reflexa*.

The synonyms were thus distributed. To var. *a*, Rumph. t. 39. f. 2, and Gualt. t. 23. f. B; to var. *g*, Rumph. t. 39. f. 3; to var. *e*, Arg. t. 16. f. R; to var. *d* ("*Cæsius atro-undatus*," not "*Fusco undulatus*" as printed), Rumph. t. 39. f. 4. The expressions "*ponderosa*" and "*magis sulcatum*" were not in the original.

V. ISPIDULA. *V. spiræ adscendente, margine unico*.

"Pet. Gaz. t. 59. f. 8," cited in the '*Systema*,' was also written in the manuscript: not so the "*Varietas forte præcedentis V. Olivæ*." None of the drawings exhibit the produced spire, which must have resembled that of *O. jaspidea*. The earlier name was *ispida*.

V. GLABELLA. *V. ovata lævis, labii margine reflexo, basi rotundata*.

The reference to Gualtieri (a doubtful figure) was not originally inserted. The intended name was *V. polita*.

V. CAFFRA. *V. fusiformis lævis*.

The absurdity of asserting, in relation to this and the next species, that each resembled the other, but was larger, arose from the circumstance that when our author, in revising the labours of his amanuensis, added "*sed major*," he omitted to erase it from the following species.

V. VULPECULA. *V. fusiformis angulata inermis, transversim striata*.

Of the ample details the first two paragraphs only were found in the manuscript. The proposed name was *V. picta*.

V. PLICARIA. *V. fusiformis, angulis antice subspinosis*.

The intended appellation *angulata* was changed from an erroneous impression of the identity of the species with the *Turricula plicata* of Rumphius. "*Mucronatis*" and "*albidus*" were emendations. "*Bonan. 8. f. 65*" was referred to, as in the '*Systema*'.

V. PERTUSA. *V. fusiformis, labro denticulato, striata punctis pertusis*.

V. denticulata was the name originally proposed for this *Mitre*.

V. MITRA. *V. fusiformis lævis, labro denticulato*.

The final paragraph was not in the manuscript, where "*Bonan. 3. t. 119, 120*," and "*Klein, 36. Mitra episcopi*," the former cited in the '*Systema*,' the latter a mere name, were quoted as illustrative.

V. MUSICA. *V. spinis obtusiusculis, columella plicis 8*.

The reference to the letters X. and Y. of Gualtieri (neither of which are illustrative) stood not thus in the original: the characteristic Z. of that work was the figure really cited. The printed edition has been enlarged by an "ob" before "ovato" the addition of "*solida*," and the description of the lips.

V. VESPERTILIO. *V. spinis acutis, columella plicis 4*.

The only printed additions are "ob" before "ovato", "s. glauca", and "fuscis lineis" in place of the "saturatus."

V. *ÆTHIOPICA*. V. spinis fornicatis cingentibus apicem papillarem.

"Habitat in mari Pacifico", "Pet. Amb. t. 7. f. 5" (copied from Rumphius, t. 31. f. B.), and "Bonan. t. 3 f. 1" (cited in the 'Systema') were the unprinted additions.

V. *CYMBIUM*. The entire account of this shell was in the handwriting of Linnaeus, and inserted at a later period than the mass of species. The decided reference to Gualtieri was not in the manuscript.

V. *OLLA* was not mentioned in the written catalogue.

In addition to the species published in the 'Museum,' the following were also characterized in the manuscript:—

V. *FABA*. V. ovata, antice subplicata, labii exterioris margine reflexo, basi rotundata.

Bonan. 3. f. 49.

Testa magnitudine vix fabæ, ovalis, lævis, antice subplicata, livida, punctis fuscis aspersa. Spira testæ $\frac{1}{2}$ brevior, subplicata. Labium exterius reflexum, basi rotundatum integrum.

This was evidently the shell so designated in the 'Systema.'

V. *GRANULATA*. V. fusiformis, sulcis longitudinalibus, striisque transversalibus.

Rumph. Mus. t. 29. f. V.

Arg. Conch. t. 12. f. V.

Testa facie antecedentis, sed sulci et striæ contrariæ, fusiformis, sulcis longitudinalibus elevatis obtusis, striis transversalibus exaratis. Color cinereus, fasciis linearibus 2 rubris ex punctis. Spira longitudine ventris. Apertura præcedentis.

This was the *V. sanguisuga* of the 'Systema.'

The preceding species referred to was

V. *LIMA*. V. fusiformis, sulcis transversis, striisque longitudinalibus.

Rumph. Mus. t. 28. f. T.

Testa fusiformis, scabriuscula, striis longitudinalibus secundum testam, et sulcis secundum anfractus adscendentibus margine acutiusculis. Color albidus sulcis elevatis rubris—albidus sulcis elevatis flavis albo interruptis. Spira longitudine ventris. Apertura oblonga, intus alba. Basis acuta, emarginata. Labium exterius integrum; interius nullum. Columella dentibus 4 obliquis.

These features fairly enough suit the *Mitra filosa*, generally, and with reason, supposed to be the *V. filaris* of the 'Mantissa.' The cited figure however, seems *M. gracilis* of Reeve.

BUCCINUM.

The species which compose this group in the 'Museum' were originally separated under many generic designations.

1. *BUCCINUM*. Testa ovata, ventricosa. Apertura integra, semilunaris, superne extrorsum, postice introrsum.

2. *CASSIDA*. Testa ovata, gibba. Cauda reflexa oblique. Apertura longitudinalis, obliqua.

3. *LYRA*. Testa ovata, ventricosa. Apertura ovata, patens, pone submarginata. Labium interius nullum. Columella compressa, nitida.

4. *TURRICULA*. (No definition: evidently intended for all the turreted shells.)

5. *MORION*. Testa oblonga, inermis. Apertura oblonga, labio interiore reflexo unidentato.

In the first were located the *Dolia*, and *B. echinophorum*; in the second the *Cassida*, with *B. papillosum* and *arcularia*; in the third the *Harpæ* and *Purpuræ*; in the fourth the *Terebræ*; in the fifth *B. glans*, *spiratum*, *glabratum*.

B. undosum was located in *Murex*.

B. PERDIX. *B. umbilicatum* subsulcatum, basi recta.

The proposed name was *B. pennatum*, adopted from Rumphius: "lunari-patula" was not in the manuscript.

B. POMUM. *B. exumbilicatum*, labio utroque dentato.

"Barr. Ic. t. 1325. f. 12" (cited in the 'Systema'), and "Klein, 95. Semicassis, striata, costosa", were the additional synonyms of the manuscript: "s. sulcata", "nullum, interne", "at vero in adultioribus accrescit planum album", were subsequent emendations.

B. DOLIUM. *B. emarginatum* subsulcatum rugosum, labio exteriori reflexo dentato.

The *Dolium fimbriatum*, or, as Deshayes prefers it, *D. Minjac* (the Malay name was *Bia Minjac* in Rumphius, who preceded Adanson), was assuredly the shell described in the 'Museum', as the recorded dentation of the outer lip clearly manifests. An excellent figure of it in Petiver ("Gaz. t. 99. f. 11") was cited in the original copy, where the drawing of Gualtieri was not referred to.

B. ECHINOPHORUM. *B.* (changed to *Cassida*) *tuberibus* ("quaterna serie" interpolated) *nodosum*.

The reference to Rumphius was correctly written *l*, not *I*, in the original, where "albido-flavescens" was the indicated colouring. The printed emendations were "quadruplici s. quintuplici", instead of "triplici", and the entire account of the aperture, which at first ran simply as follows, "Labium exterius crassius, margine tenuiore, interne subrugosum, obsolete dentatum."

B. TUBEROSUM. *B. tuberibus* gemina serie *nodosum*.

The entire published account of this species had been interpolated by Linnæus in the written copy, with the exception of the "color pallidus." The "nodis anterioribus" was a misprint for "nodis acutioribus."

Gualtieri's admirable figure of the *Cassis tuberosa* of authors was not, however, cited, which confirms my statement that the species of the 'Museum' was not the *Cassis* usually so designated.

B. CORNUTUM. *Cas. acuminibus antice cingentibus, superficie reticulata.*

The I in the reference to Rumphius was a misprint for the written l : "maculata" was originally "maculis griseis."

B. RUFUM. *Cas. nodis sparsis.*

"Pyri" was a misprint for the written "pugni". Neither the "maculis fuscis" nor the "Variat tota albo colore" were originally present. The Rumphian name *rubra* was the one written.

B. FLAMMEUM. *Cas. longitudinaliter striata, antice subnodosa.*

To the solitary synonym our author had added "List. t. 1004. f. 69" and "Sloan. Hist. 2. p. 242. n. 2". The final remark was not in the copy.

B. TESTICULUS. *Cas. lævis, striis longitudinalibus, sulcis transversalibus.*

"Vix ullus" was at first "nullus": "læve" was not present.

B. DECUSSATUM. *Cas. lævis, striis decussatis, labio exteriore dentato.*

"Bonan. Clas. 3. t. 157" was an additional synonym.

B. AREOLA. *Cas. glabra, spira papillosa.*

The erroneous references to Gualtieri, and to the figure 2 of Rumphius, were not present in the original, nor was there any allusion made to the sculpture of the inner lip.

B. ERINACEUS. *Cas. subsulcata, antice nodosa, labio edentulo, postice extrorsum denticulato.*

The entire account of this *Cassis* was interpolated by Linnæus in the pages of his amanuensis.

B. GLAUCUM. *Cas. glabra, antice muricata, labio dentato, postice extrorsum denticulato.*

The superfluous A in the reference to Gualtieri was a misprint: "inferne" was "interne": the "acuminata" and "marginatum" were emendations.

B. VIBEX. *Cas. glabra, labio edentulo, postice extrorsum denticulato.*

The figures 8 and 9 of Rumphius were not cited.

B. PAPILLOSUM. *Cas. papillis decussatis, labio tenui, extus denticulato, fauce glabra.*

"Rectum" followed "exterius" in the written copy, wherein "s. albidus" and "antice sinu excavata" were not to be found.

B. GLANS. *Morion labio exteriore denticulato, interiore bidentato.*

"Labium exterius margine postico denticulato" was omitted in printing.

B. ARCULARIA. *Cas. longitudinaliter sulcata, labio exteriore tenui, interiore maximo.*

B. COSTATUM. *Lyra costis longitudinalibus, antice prominulis, alternis obsoletis.*

This diagnosis but ill suits the *Many-ridged Harp*, which, of late, has been considered identical.

B. HARPA. *Lyra costis longitudinalibus antice mucronatis.*

The shell is described in the MS. as "striata subtilissime longitudinaliter", and "Pet. Amb. t. 2. f. 2", "Pet. Gaz. t. 48. f. 13" (the latter quoted also in the 'Systema') are there substituted for the reference to Gualtieri.

The printed additions are considerable; to wit, "costæ vero striis transversis", "anfractibus costis mucronatis", "denticulatum."

B. PERSICUM. *Lyra læviuscula*, labii margine crenulato.

The erroneous citation of Grew (t. 9. f. 5, 6) in the 'Systema' had been adopted in the manuscript.

B. PATULUM. *Lyra muricata spinis obtusis*.

Neither the erroneous reference to Gualtieri, plate 51. f. A (which was designed for *Purpura hæmastoma*), nor the "color interne rufescens", is to be found in the manuscript.

B. SMARAGDULUS. *Lyra glaberrima*, columella denticulata.

Neither the erroneous reference to d'Argenville, nor the specific name derived from his figure, is to be found in the MS. The proposed appellation was *L. vitrea*. "Simillima Cassid. lapillo, sed glabra, et columella crenata" is the unprinted remark.

B. SPIRATUM. *Morion umbilicatus*, anfractibus distinctis canaliculo.

The specified colouring was "alba, maculis longitudinalibus fuscis": "pone bifidum" followed "integrum." The intended name was *M. canaliculatus*.

B. GLABRATUM. *Morion umbilico descendente flexuoso*.

d'Arg. Conch. t. 12. f. G.

"Testa oblonga, acuminata, obtusiuscula, glaberrima, anfractibus confluentibus, Neritarum maximarum pondere. Color albo-flavescens, nitidus. Apertura obliqua, profunde emarginata. Labium exterius integerrimum. Labium interius antice reflexum adnatum, dein solutum brevius flexuosum, descendens ad basin. Sulcus profundus distinguit basin testæ. Umbilicus pone labium interius descendens ad basin sulco."

B. VIRGINEUM. I can find no account of this shell in the written copy.

B. UNDOSUM. The nearest approach to this species seems the variety B. of the *Murex succinctus* (the shell so named in the 'Mantissa').

M. lævis, sulcis transversis lævibus, angulo marginali.

d'Arg. Conch. t. 12. f. N. Bon. 3. f. 47.

Testa ovata, absque tuberculis, magnitudine nucis, exarata sulcis transversis pallidis, eminentibus vero lineis luteis. Spira obtusa, anfractibus rotundatis. Cauda teretiuscula. Apertura ovata, margine crasso, nec alia costa laterali crassa.

Var. B. Rugis s. angulis oblitteratis 5 longitudinalibus.

B. MACULATUM. *Turricula elongata*, anfractibus lævibus integerrimis.

The I. of Gualtieri, and the reference to d'Argenville, were printed emendations.

B. CRENULATUM. *Turric. elongata*, anfractibus margine crenatis.

The reference to Gualtieri was an emendation.

B. STRIGILATUM. *Turric. elongata*, oblique striata.

B. DUPLICATUM. *Turric. elongata* emarginata, anfractibus bipartitis striatis.

STROMBUS.

This genus, rendered more natural by the omission of *S. lividus* and *aster* (assigned to *Turricula*), appeared under the designation of HARPAGO with the following definition :—

Testa depressa, nodosa. Apertura longitudinalis. Labium antice dilatatum ultra basin.

The *Strombi* of the manuscript were the young of this genus (erased by Linnæus) and certain Lamarckian *Fusi*, *Pyrula*, and *Fasciolaria*.

S. CHIRAGRA. *Har.* labii spinis lævibus 6, extimis recurvis, fauce striata.

"Bar. Icon. 327. f. I." was an additional synonym.

S. SCORPIUS. *Har.* labii spinis nodosis 7, fauce striata.

The published account was enlarged by the following passages, which are not to be found in the written copy: "crenulato cincta", "lato, brevi", "s. incarnata", "s. testaceo-nebulosus". "Distinctum" was originally "obscuro", and "repandus, inflexus" was "denticulatus."

S. LAMBIS. *Har.* labii spinis lævibus 7, fauce lævi.

"Bar. Icon. t. 1326. f. 7" was the synonym omitted in printing. The name was borrowed from d'Argenville.

S. MILLEPEDA. *Har.* labii spinis lævibus 10.

"Anteriora" was "posteriora" in the manuscript.

S. LENTIGINOSUS. *Har.* labio inermi integro rotundato, angulis pluribus nodosis.

The "aut marginatum" was "fragile, diaphanum", so that a young shell appears to have furnished the materials for description.

S. GALLUS. *Har.* labio inermi mucronato, cingulo dorsali spinoso.

S. AURIS-DIANÆ. *Har.* labio inermi muricato, cauda recurva, lobo incurvato.

The "32. f. H." was a misprint for the written "17. f. O." The printed additions are "usque" and "Color testaceo et albido nebulosus."

S. PUGILIS. *Har.* labio inermi obtuso, spira spinosa distincta, basi emarginata.

"Nitida", and "sed spira albida", were not found in the original.

S. LUHUANUS. *Har.* labio obtuso, antice posticeque emarginata.

Few of the details were present in the original copy, but appear to have been added, to discriminate the species from the allied *gibberulus*. "Spira obtusa brevis" was added by the hand of Linnæus; "sæpe subplicati", "postice lobo obsoleto instructum", "intus", "Columella nigricans", "Cauda nulla, sed postice emarginata", were all absent from the MS.

S. GIBBERULUS. *Har.* labio inermi, dorso lævi, spira repanda.

The printed additions are "subtus planiuscula", "læves", "fuscum", and the final remark.

S. LATISSIMUS. *Har.* labio inermi rotundato, spira subnodosa brevior, dorso lævi.

S. EPIDROMIS. *Har.* labio inermi dilatato, dorso lævi, spira subnodosa.

The *S. epidromis*, as it originally stood in the manuscript, was a recognizable species, and precisely identical with the shell so named in the 'Systema'; for the erroneous reference to Gualtieri was not present, neither was "carinato," nor any of the discordant details from "interius" to the termination. As the printed description now stands, it would suit *S. emarginatus* or *succinctus*, at the least, equally well. I doubt not our author, when correcting the press, forgot his own species, and added the partial essentials of one species to those of another.

S. CANARIUM. *Har.* labio inermi dilatato, dorso spiraque lævibus.

The erroneous reference to plate 37 of Rumphius was not present in the written copy, which contains the additional synonyms of "Pet. Gaz. t. 98. f. 11", and "Klein, t. 4. f. 73": the latter was not there originally. The early description has been improved, in the press, by the addition of "obovata", "Faux lævis, alba", and "longitudinaliter subundulatus."

S. VITTATUS. *Har.* labiis inermibus, spiræ anfractibus vitta interstinctis.

S. URCEUS. *Har.* labiis inermibus striatis, dorso nodoso.

The erroneous reference to Gualtieri was not present in the original, but in place of it the 37. W. of Rumphius (*S. mutabilis*): "Spira testa brevior, plicato-subnodosa" was, likewise, absent. "Klein, 49, urceus fimbriatus" (a name for Rumph. t. 37. f. F & W) was interpolated by our author.

S. ATER. *Turricula* labiata.

Neither the reference to Rumphius, nor the "et postice emarginatum" were found in the original. This confirms my expressed belief that the Museum species (to which no name was at first attached) was distinct from that of the 'Systema.'

S. LIVIDUS. *Turric.* labiata, anfractibus serie subspinosa.

This was located in a section of *Turricula* distinguished as having the outer lip dilated and rounded.

Besides the above, the following unprinted details were found in the manuscript:—

The *Strombus gigas* was described at length under the appellation of *Harpago gigas*.

Har. labio inermi rotundato, dorso spiraque subulato-spinosis.

Gualt. t. 34. f. A. Bar. Icon. 1727. f. 7.

Testa gibba, maxima, magnitudine capitis. Cauda obtusa. Spira spinis patentibus, subulatis, validis. Anfractus desinens in dorso spina. Series in dorso spinarum maximarum ferme conicarum. Labium dilatatum, rotundatum, spira longius, vix adnatum spiræ. Faux glabra, nitida, incarnata. Color pallidus.

The *Strombus dentatus*? was also defined (without a specific appellation) by the following characters:—

Har. labio dentato, testa lævis, plicato-nodosa.

Testa simillima reliquis, longitudine articuli digiti, lævis, flavescentes, sub-

plicata, plicis antice acuminatis nodis. Spira acutiuscula, similiter plicata, nodosa. Labium exterius minus dilatatum, postice margine dentatum et interne fuscum, striatum. Labium internum crassum, integrum, læve.

The *Strombus palustris*, although not published until the twelfth edition of the 'Systema,' had been already defined in the 'Museum' as *Turricula cornes*.

Twr. decussatim rugosa, labio dilatato.

Rumph. 101. t. 30. f. Q. *Strombus palustris*.

Testa crassa, rudis, pyramidalis, cornea aut plumbea, anfractibus 12 et ultra, secundum spiras transversim aliquot striis exarata, longitudinaliter subplicata, adeoque sine spinis rugosissima. Labium dilatatum, rotundatum, concavum, edentulum.

MUREX.

The definition of this genus ran as follows :—

Testa subovata, spinosa. Apertura coarctata, ovata, desinens in canalem tubuloso-conniventem.

This was evidently designed for the *Murices* proper. The other species of the 'Museum' were distributed in the groups of *Cassia*, *Turricula*, *Bulla*, and *Strombus*. The last was defined as follows ; "Testa obverse conica, nodosa, labium exterius angulum transversalem superne formans ; interius nullum. Columella incurva. Cauda integra."

M. HAUSTELLUM. M. caudatus, subinermis, nodosus.

"Suturis" was originally "costis". The printed emendations are "gibbis, adglutinatis", "costati et nodosi", "subtus rima longitudinali clausa", "margine", and the final remark.

M. TRIBULUS. M. caudatus, spinis subulatis trifariis.

"Olear. Mus. t. 39. f. 1" was cited in the transcript, to which Linnæus had added "Bonan. 269" and "List. t. 902. f. 22", all which synonyms are present in the 'Systema.' The printed additions are "suturis 3 longitudinalibus, adglutinatis, incrassatis", "secundum suturas : superficies transversim striis elevatis distinctis", "recta".

M. CORNUTUS. M. caudatus, spinis subulatis serie gemina.

The s. in the reference to Rumphius was a misprint for the written 5 : "Pet. Gaz. t. 68. f. 12" (as in the 'Systema') was present in the copy. The expressions "striata", "conicæ", "obliquo situ", and the final remark, are the printed additions.

M. TRUNCULUS. M. subcaudatus, spinis simplici serie.

The description of the tail and account of the variety were not originally present : "suturis" was, at first, "plicis", and "adglutinatis" was "antrorsum adnatis".

M. RAMOSUS. M. dædaleus triangularis, spira longitudine ventris.

Had the original manuscript been printed, the multitude of species confused under this appellation would have been somewhat lessened. For the cited figures of *M. inflatus* (Rumph. t. 26. f. A, and Gualt. t. 38. f. A), with that of another short-spined *Murex* (Arg. t. 19. f. C), were separated from

the rest, and quoted for a *M. unguis-odor*, the brief definition of which was "*M. dædaleus triangularis, spira ventre brevior.*"

The published details, and the drawings of the longer-spined and more slender-bodied *Murices* (Rumph. t. 26. f. 1; d'Arg. t. 19. f. E, H.), appeared as *M. lichenoides*.

I consider, then, that in that event the *M. adustus* (Arg. t. 19. f. H.), which would tolerably suit the definition, would have been considered the typical form, and *M. axicornis* (Rumph. t. 26. f. 1, and d'Arg. t. 19. f. E.), the variety γ .

M. SCORPIO. *M. dædaleus quadrangularis, spira subcapitata.*

The ill-judged final remark was not in the copy.

M. SAXATILIS. *M. dædaleus quinquangularis, spira contigua.*

The idea of this being a mere variety was not expressed in the original.

M. RANA. *M. angulatus subdepressus, costis lateralibus.*

The R. of d'Argenville was properly referred to the variety B. The "alba", "sulcis transversis", and "Dorsum anfractum simplici cingulo aculeato" were not in the copy.

M. LAMPAS. *M. angulatus tuberculis nodosis, cauda flexuosa, labio interiore lævi.*

The earlier reading of "una alterave ruga" was "uno alterove denticulo."

M. FEMORALE. *M. angulato-triqueter: angulis antrorsum acuminatis.*

The intended name was *M. triqueter*. Grew's engravings (f. 7, 8) of the species were correctly cited, and the erroneous reference to Rumphius was not inserted. The printed additions were unimportant—"exarata", "repando", "sub" before "edentula", and "levissime".

M. LOTORIUM. *M. angulatus, tuberculis conicis, cauda flexuosa, labio interno rugoso.*

"Subter" was a misprint for the written "inter": the "ut in proximis" was a printed addition.

M. RUBECULA. *M. angulatus, sulcis moniliformibus, costis lateralibus, dorsaliq.*

"Gualt. t. 49. f. I" was rightly cited as illustrative: "ex" preceded "lineis".

M. RETICULARIS. *Cas. inæqualis gibba reticulata, cauda elongata.*

The erroneous reference to Rumphius was not present in the manuscript. As corroborative of my expressed belief in the identity of the species described in the 'Museum' with the *Triton! mulus*, it may be observed, that our author has wholly separated this and the allied *anus* from the true *Tritons* and *Ranellæ*, and that the original heading corresponds accurately with the peculiar characteristics.

M. ANUS. *Cas. inæqualis, gibba nodosa, labris rugosis.*

"Pet. Gaz. t. 74. f. 9" and "Pet. Amb. t. 6. f. 4" were the unprinted synonyms. The "rugis reticulato-intertextis", "irregularis", and "patens" were emendations.

M. RICINUS. *M. ecaudatus, ore utrinque dentato.*

"Æqualibus, ad labium majoribus" was not in the copy.

M. CAPITELLUM. *M. ecaudatus ovatus, columella rugosa, labio edentulo, superficie inermi rugosa.*

"Alba" followed "edentula", and "Umbilicus ad basin" terminated the description in the original: the word "striis" was a subsequent introduction.

M. TURBINELLUS. *M. ecaudatus, turbinatus, columella dentata, spinis explicatis.*

The printed additions are "anteriores", "nodulosa", "alba", "Cauda vix ulla", and "Variat colore albo spira longiore".

M. CERAMICUS. *M. ecaudatus, utrinque acuminatus, columella dentata, spinis conicis.*

"Rumph. t. 49. f. L." was an unpublished synonym.

M. NODUS. *M. ecaudatus ovatus, labio denticulato.*

As "Gualt. t. 28. f. R." was quoted, and "aut nigris, conicis, obtusiusculis" (a character which probably belonged to some distinct species erroneously supposed to be a variety) was not inserted in the manuscript, I feel convinced that the *Purpura hystrix* of authors was the species designed in the 'Museum Ulricæ.'

M. HYSTRIX. *M. ecaudatus edentulus, fauce lævi.*

M. MANCINELLA. *M. ecaudatus, edentulus fauce striata.*

This original heading, and the absence of the erroneous synonym from the MS., confirm the received opinion of the identity of the Museum species (not that of the 'Systema') with *Purpura mancinella*.

M. HIPPOCASTANUM. *M. ecaudatus edentulus, fauce edentula integra, spinis serie triplici.*

Gualtieri's erroneously cited figure was not indicated in the manuscript. No specific name had been originally attached to the description.

M. MELONGENA. *M. ecaudatus edentulus fauce patula lævi, spinis serie duplici.*

"Bonan. 3. f. 186" had been added to the synonymy by our author. The details were less copious than in the published edition, "apice solo acuminatus" being the meagre substitute for the entire description from "Spira" to the end.

M. FICUS. *Bwl. caudata, striis reticulatis, spira obtusa.*

"Pet. Amb. t. 6. f. 9" was an omitted synonym. The shell described in the 'Museum' was assuredly not the *ficus* of most writers.

M. RAPA. *Bwl. caudata, striis longitudinalibus, spira acuta.*

M. FUSUS. *Turric. caudata lævis, labio dentato.*

"Bonan. f. 121" and the name had been added to the MS. by Linnæus.

M. BABYLONIUS. *Turric. caudata, transversim angulo sulcata, labio marginali versus basin sinu exciso.*

M. COLUS. *Turric. caudata striata, labio exteriore crenato.*

The printed emendations were "longa" and "s. angulati." The name was added by Linnæus. The following unnamed *Turricula* succeeded the species in the manuscript copy:—

T. caudata striata, longitudinaliter sulcata.

Testa parva, striis plurimis secundum anfractus. Anfractus scabri, sulcis longitudinalibus 15. Color anfractuum superne griseus inferne pallidus. Apertura ovata. Rostrum baseos rectum, testæ dimidio brevius. Labium tantum exterius integrum. An filia præcedentis?

M. MORIO. Strom. spira subnodosa, labio exteriori intus rugoso.

The synonymy, as might be expected (for Seba was unknown to Linnæus when the descriptions were written), was not in the original.

M. COCHLIDIUM. Strom. spira pyramidata, anfractibus planis.

The reference to Seba, the name, and the "*Cauda subulata, longitudine testæ*" were not present.

M. CANALICULATUS. Strom. spira subconvexa, anfractibus distantibus.

The "*Anfractus distincti canaliculo per omnes spiras,*" the name, and the reference to Seba, were the printed additions. "*Habitat in Canada. Kalm.*" was appended.

M. ARUANUS. Strom. incurvus spinosus ventricosus, angulo obsoleto.

The objectionable name (for assuredly the *Buccinum Aruanum* of Rumphius suits not "*spinosus*") was not present in the original, but had subsequently been added by our author, who seems to have erased the original "*Habitat in Canada. Kalm.*" I doubt not that *Pyrula carica* was intended.

M. PERVERSUS. Strom. inversus.

The wretched engraving of Gualtieri was not cited.

M. TRITONIS. Cas. pyramidalis lævis, columella dentata.

"*Bonnæ. 3. f. 188*" stood in the place of Seba. The printed additions were "*plerisque*", "*et suturis variis alternis crassis*", and the specific epithet. "*Genus difficile eruitur*" was written after the description, and the following note erased:—"Ad genus retuli ob labium interius adnatum in quibusdam latius, ob saturas verrucosas, ob caudam canaliculatam parum elevatam, ob labium postice dentatum, quæ omnia affinitatem arguunt."

The *Triton nodiferus* was probably designed by the following description, which succeeded that of *M. Tritonis*:—

Cas. (corrected by Linnæus to Murex) Neptuni. C. pyramidalis nodosa, columella dentata.

Testa maxime facie statura et colore præcedentis. Anfractuum angulus summus nodis prominentibus, unde et spira nodosa evadit, quod non in præcedente. Apertura præcedentis. Labium interius magis dilatatum, maximeque planum. Columella non dentata. Habitat Constantinopoli. Edw. Carleson.

M. TRAPEZIUM. Strom. spira nodosa, labio denticulato, columella rugosa.

M. ALUCO. Turric. recurvirostra, spinosa, serie simplici.

Gualtieri was not cited, and the reference was to "*N. Strombus tuberosus*" (*Corithium aluco*), not *O. (C. nodulosum)* of Rumphius. The inner lip was described as "*non adnatum, sed prominens*": "*s. fuscis*", and "*Variat cauda recta, &c.*", were not in the original.

Besides the published species, the following had been written, but omitted in printing:—

TURRICULA ALBA. *T. alba recurvirostra*, anfractibus margine crenulatis.

Bon. 3. t. 84. Rumph. t. 30. f. K. Pet. Gaz. t. 56. f. 4. d'Arg. Conch. t. 14. f. P. Gualt. Test. t. 57. f. D.

Testa leviss. Anfractus circiter 15, margine subcrenati. Color albus, sæpius saturatior ad marginem anfractuum. Apertura ovata, rostro canaliculato, recurvo. Labium interius adnatum, dente unico obsoleto.

This was evidently identical, from its synonymy, with the *M. vertagus* of the 'Systema.'

TURRICULA SENTICOSA. *T. reflexo-emarginata*, costis reticulatis.

d'Arg. Conch. t. 12. f. O.

Testa gibba, costis sæpius 12 perpendiculari-obliquis, intertextis striis lamellois transversis ad anastomoses muricatis, unde admodum scabra evadit. Anfractus ventricosi, sæpius x. Color griseus. Apertura ovata, interne striata, emarginata, parum reflexa.

Evidently this was identical with the *M. senticosus* of the 'Systema.'

M. OLEAGINEUS. *M. angulis sulcis inæqualibus*, labio interiore rugoso, costis alternis.

Gualt. Test. t. 49. f. G. d'Arg. Conch. t. 13. f. M.

Habitus et structura *rubecula*, at octies major, nec vivide pictus, sed colore testaceo fasciis fuscis longitudinalibus. Apertura intus saturate crocea, rugis albis.

Apparently this was the *Triton pileare* of authors,—not the Mediterranean shell (*T. corrugatus*) termed *M. pileare* in the 'Systema.'

M. PILEUS HELVETICUS. *M. angulis rotundatis*, tuberculis conicis, apertura utrinque canaliculata.

d'Arg. Conch. t. 12. f. D. Rumph. t. 28. f. D.

Testa ovata, admodum inæqualis, adpersa nodis conicis tuberculatis inæqualibus. Costæ latere antico membranaceæ, primæ 2 oppositæ, reliquæ alternæ. Color flavus. Apertura hians, antice et postice canaliculatæ, faux intus striata. Labium exterius dentatum, intus dilatato-membranaceum.

This suits very fairly the *Triton lampas* of authors; far better, indeed, than does the *M. Lampas* of the 'Museum Ulricæ.'

M. SUBULATUS. *M. ecaudatus*, pyramidalis.

Testa subulata instar turris, anfractuum undecim, reticulata striis elevatis decussantibus punctis contignationem eminentibus. Costæ oppositæ et alternæ. Color albus, maculis flavescentibus. Apertura ovata. Labium exterius crassum, intus dentatum. Interius dentato-glabrum.

Both *Triton! maculosus* and *Ranella candidata* approach the ideal portrait, yet neither of them precisely agrees.

Under the name of *Trochus turritus* our author appears to have first described his *Murex radula*.

Trochus exumbilicatus, pyramidatus, anfractibus duplici serie muricatis Gualt. t. 58. f. F.

Testa elongata, flavescens s. testacea. Anfractus 16, connexi suturâ crenulatâ, dorso duplici serie instructi punctis eminentibus pallidis. Apertura subtetragona, subtus in canalis rudimentum desinens.

The *Murex Neritoides* of the 'Systema' was thus described.

LYRA NERITOIDES. L. testa nodosa subrotunda.

Gualt.

Testa crassa, ponderosa, alba cum rubedine tincta, figura Neritæ, magnitudine juglandis, cincta anfractibus 5 e nodis obtusis crassiusculis. Labium interius depressum, longitudine pictum macula ferruginea.

TROCHUS.

Testa conica. Apertura quadrangularis, basi columella contorta, sinu descendens.

The last five words had been substituted for "absque sinu evidente."

T. MACULATUS. T. contorto-umbilicatus conicus, vertice subnodoso.

The printed description and the synonymy are so very dissimilar to the written one, that I entertain no doubt that an early definition of *T. Niloticus* (with references to "Olear. Mus. t. 9. f. 5" and "Bonan. 3. f. 102") was transmuted into that of a granular species, by the addition of "quasi granis exasperata," &c.

T. SOLARIS was not mentioned in the manuscript.

T. PERSPECTIVUS. T. crenato-umbilicatus convexus obtusus: margine acuto.

"Bonan. 3. f. 27, 28" was quoted, as illustrative: "costa crenata", not "costa concava", was the earlier reading.

T. HYBRIDUS. T. crenato-umbilicatus, convexus, undique obtusus.

The proposed name was *T. spurius*. The "absque carina, rotundata" was "absque angulis, glabra": "albo, flavoque" preceded "variegata".

T. PHARAONIUS. T. umbilicatus subovatus striatus, punctis globulosis, labio dentato.

"Habitat in mari rubro, frequens. D. Hasselquist." was written: the final remark was absent.

T. MAGUS. T. umbilicatus convexo-conicus nodosus.

The "cinereo nebula" was a manuscript emendation by Linnæus.

T. MURICATUS. Except that "obverse" precedes "ovata", both the diagnosis and the details are precisely similar to the printed account.

T. SCABER. T. umbilicatus subovatus, sulcis alternis majoribus moniliformibus.

The erroneous figure of d'Argenville was not cited in the original, nor, indeed, was any name attached to the description. The whorls were said to number from 6 to 8 (not 4 or 5); and the aperture was termed "ovata," not "subrotunda." "Pallida", the final remark, and the present construction and enlargement of the passage relative to the inner lip (which at first ran thus, "Labium posticum coadunatum, sinu postico excisum"), had been added by Linnæus himself.

T. LABIO. *T. exumbilicatus ovatus striato-tuberculatus, labio dentato.*

The erroneous figure of d'Argenville was not cited; "*variegata*" was the earlier reading of "*marmorata*"; "*aliquot*" of "*et punctis*"; "*externo*" of "*marginē*". Linnæus himself had enlarged the account of the inner lip from the earlier "*postice sinu excisum*" to its present length.

T. ZIZYPHINUS. *T. umbilicatus conicus, striis papillois.*

This is clearly not the imperforated *zizyphinus* of the 'Systema.' Gualtieri was not referred to; "*ambitu marginati*", and "*in aliis clausus*", were not in the copy: "*columella parum obliqua*" was an addition in the Linnean handwriting.

T. TELESCOPIUM. *T. exumbilicatus pyramidatus, striis exaratus; labio postice recurvato, spirali, integro.*

"Bon. 92", and "Klein 26. *Pseudotrochus striatus*", were the additional synonyms of the MS.

T. DOLABRATUS. *T. umbilicatus, labio postico recurvato sulcato, ovato-pyramidalis, glaber.*

The whorls were at first called imbricated. The "*basis rotundata*", and "*in superioribus vero unica*", had been added by Linnæus.

TURBO.

Testa conica. Apertura orbicularis, integra.

T. PERSONATUS. *T. exumbilicatus inermis convexus, labio postice diducto.*

The I of the reference to Rumphius was a misprint for the written l. A drawing of Gualtieri (t. 64. f. O), which accords not with the description of this species, was an additional synonym. The name had been added subsequently. *Turbo cidaris* agrees in most respects.

T. PETHOLATUS. *T. exumbilicatus ovatus lævis, anfractibus sursum obsolete angulatis.*

The written version furnishes us with the additional synonyms of "Gualt. t. 64. f. F.", and "Klein 40. t. 2. f. 51."; the latter (also cited in the 'Systema') was added by our author when he admitted the at first excluded 5. 6 of the synonym of Rumphius. The admission of the rounded-whorled variety? was evidently an after-thought.

T. CHRYSOSTOMUS. *T. exumbilicatus subovatus rugosus striatus, spinis fornicatis.*

"Klein 41. t. 7. f. 126" (cited in the 'Systema'), and the printed "*in superiore serie majoribus*". had been added by Linnæus in the original account.

T. TECTUM-PERSICUM. *T. exumbilicatus subovatus, spinis obtusis reflexis, subtus papillois.*

"Forte sola varietas sequentis a loco" has been remarked by our author, who did not admit in his MS. the deceptive figure of d'Argenville.

T. PAGODUS. *T. exumbilicatus conicus spinis obtusis concatenatis, subtus papillois striatus.*

Neither "*acuminata*", nor the inappropriate "*rotundata*", were in the original account of this well-known species.

T. CALCAR. *T. exumbilicatus depressus, anfractibus supra spinis fornicato-compressis scabris.*

To his printed synonyms Linnæus has added "*Gualt. t. 65. f. N. P.*", "*List. Hist. t. 608. f. 46*", and "*Klein t. 1. f. 27*". The "*fornicatis*" was an emendation.

T. MARMORATUS. *T. exumbilicatus subovatus nodosus lævis.*

T. PICA. *T. umbilicatus lævis conicus denticulo umbilicali.*

"Habitat in Barbados, Jamaica", which corrects the stated locality of the '*Systema*,' and "*Bonan. 29, 30*", "*Pet. Gaz. t. 70. f. 9*", were the additional particulars of the manuscript copy.

T. ARGYROSTOMUS. *T. umbilicatus subovatus, striatus lineis dorsalibus.*

The erroneous references to Gualtieri and d'Argenville, were not present: "*os argenteum variegatum*" was written after the reference to Rumphius, which name belongs to figure 3, not to 4, whose colouring, moreover, excludes it from being illustrative. The intended specific name was "*os variegatum*."

T. MARGARITACEUS. *T. exumbilicatus subovatus, (? angulo) dorsali elevato, ore postice diducto.*

Rumphius was not referred to in the original, where "*subtilissimis*" was in the place of "*variis*": the printed "*marginē albo*" was a subsequent emendation.

T. DELPHINUS. *T. umbilicatus depressus hispidus, spinis ramosis.*

"*Pet. Amb. t. 3. f. 1*", and "*Grew Mus. t. 11. f. 5, 6*", were also cited.

T. DISTORTUS. *T. umbilicatus muricatus undique spinulis brevibus.*

The final remark was not in the original.

T. SCALARIS. *T. cancellatus conicus, anfractibus distantibus.*

"*Pretium immensum, sæpe 100 ducatorum*", was the final remark instead of the printed one. "*Pet. Amb. t. 2. f. 9*", was an additional synonym in the written version.

T. CLATHRUS. *T. cancellatus pyramidatus, anfractibus contiguis lævibus.*

All the synonyms of the tenth edition of the '*Systema*,' together with "*Johnst. t. 11, f. 9*", were present in the MS., but most of them, together with the final remark, had been subsequently added to the copy by our author.

T. CRENATUS. *T. cancellatus pyramidatus, anfractibus contiguis supra crenatis.*

The details of the '*Museum*' were referred to before their publication. "*Pyramidalis*" was the earlier reading for "*turrita*"; "*sæpe*" was absent: "*transversim*" preceded "*crenati*."

T. UVA. *T. cancellatus ovatus, anfractibus contiguis imbricatis.*

"*Pet. Gaz. t. 27. f. 2. Olivaris*" was the unpublished additional synonym, and the intended name was borrowed from that work. "*Longitudinalibus*" was "*transversis*" in the copy, where "*ut latus planum non conspiciatur exterius distincta linea*" terminated the account of the volutions: the colouring ("*alba*") was not indicated.

T. CORNEUS. *T. umbilicatus*, anfractibus teretibus decussatim striatis, oris margine reflexo.

The "s. cornea", the name, and the "vix manifeste" had been added to the original account, which latter was referred to previous to its publication.

T. IMBRICATUS. *T. pyramidalis*, anfractibus deorsum subimbricatis.

The "præcedentibus tribus", here mentioned, were not those which the species now follows, but nos. 358, 359, 360, after which it was placed in the MS. "Grisea" had been added by Linnæus.

T. REPLICATUS. The entire account of this shell was interpolated in the MS. by Linnæus.

T. ACUTANGULUS. *T. pyramidalis*, sulco unico acuto majore.

The last four words of the details were written subsequently to the earlier description, to which no name was then appended.

T. DUPLICATUS. *T. pyramidalis*, sulcis 2 acutis.

"Bonan. 3. f. 114", and "List. 160. t. 3. f. 7", were additional synonyms; both, however, were quoted in the 'Systema.' The "color albus", and the term "obtusiores", were in the Linnean handwriting.

T. TERREBA. *T. pyramidatus*, sulcis 6 acutis.

"Bonan. 3. f. 115" was in the place of the doubtful figure of Rumphius; the indicated colouring was simply "pallida": the "obsoletum" was an afterthought.

HELIIX.

Testa cochleata, lævis. Apertura subrotunda segmento circuli exempto.

Except *scarabæus* and *amarula*, the members of this genus were located in the same group as in the published edition.

H. SCARABÆUS. *Morion ovatus* subanceps, labio utroque tridentato.

The "ovata, adeo" has replaced the earlier "ita", and "angulata" the original "articulata". The account of the aperture was not inserted in the manuscript, wherein "List. Hist. 577. f. 31", and "Klein 11. t. 1. f. 23", had been inserted in the Linnean handwriting.

H. LAPICIDA. *H. marginata perforata convexa carinata.*

"Cincta" was a press emendation. The only written synonym was "Faun. Suec. 1298".

H. OCULUS-CAPRI. *H. marginata perforata subcarinata.*

"Pet Gaz. t. 76. f. 6," was indicated as a synonym. The name was Latinized from the "*l'œil de bouc*" of d'Argenville, who has, however, represented an utterly different shell.

H. CAROCOLLA. *H. submarginata imperforata carinata, labio interiore recto.*

D'Argenville's figure was, evidently, not at first considered sufficiently illustrative to be referred to: it was not cited in the written copy. "Connicoplaniuscula" was the reading for "convexa", "segmento circuli" (the $\frac{1}{2}$ without any sequence was absurd) for "semiovata": the size, as usual, was not given.

H. CORNU-MILITARE. *H. marginata imperforata subcarinata, labio interiore explanato.*

The deceptive figure of Gualtieri was not at first cited.

H. CORNEA. *H. marginata convexa umbilicata, spira plana.*

"Faun. Succ. 1304" was in place of the reference to 'Lister's English Conchology,' a work apparently unknown to our author when he first drew up the Museum Catalogue. I doubt the identity of this shell (the intended name for which was *tabellaris*) with the cornea of the 'Systema.'

H. CORNU-ARIETIS. *H. utrinque depressa.*

"List. Hist. t. 136. f. 40" was written by our author in the manuscript copy.

H. AMPULLACEA. *H. subrotunda, sursum ventricosior glabra.*

The original reading of "anfractus superne ventricosi" was "abdomen superne ventricosius". The erroneous reference to Gualtieri was not at first attached to the description. The species of the Museum was evidently distinct from that of the 'Systema.'

H. GLAUCA. *H. subrotunda acuminata, labro postice marginato.*

H. CITRINA. *H. umbilicata convexa obtusa.*

The final remark was an afterthought.

H. ARBUSTORUM. *H. marginata perforata convexo-acuminata, ore suborbiculari, margine duplici, antice elongato.*

"Faun. Succ. 1295" was the only synonym; the work of Lister on English Conchology not having been at first known to Linnæus.

H. UNGULINA. *H. marginata perforata spiralis convexa, ore suborbiculato.*

The "Gualt." was a misprint for the written "Rumph."

H. LUTARIA. *H. ovato-oblonga umbilicata, interne coloratiore.*

"Habitat frequens in lutosiis fluviis, lacubus." May not the *Valvata piscinalis* be the shell intended?

H. PERVERSA. *H. ovato-oblonga subperforata glabra.*

"Pet. Gaz. t. 44. f. 7", and "Grew. Mus. t. 10. f. 9", cited in the 'Systema', were also referred to in the MS. "Alba", and "in quibusdam", were interpolations in the Linnean handwriting: *H. sulphurata* was the intended designation.

H. IANTHINA. *H. subrotunda obtusa patula diaphana.*

The entire account of this beautiful shell was written by Linnæus subsequently to the labours of his amanuensis: the twelve last printed words were not present. The cited figure of Gualtieri was not admitted, as a representation, but only alluded to in the final remark of "Confer Gualt. t. 64. f. O." "List. Hist. t. 572. f. 23", and "Sloan. Jam. 2. p. 239. t. 1. f. 4" were indicated as delineations.

H. NEMORALIS. *H.*

"Habitat ubique in Europæ nemoribus", and "Argen. t. 32. f. 8", were the unprinted additions. Lister's English Conchology was not, of course, mentioned. "Flavescens", and "nigro-purpurascens", were not in the original.

H. HÆMASTOMA. *H. imperforata subrotunda fusca fascia longitudinali subrecta alba, ore purpureo.*

H. DECOLLATA. *H. elongata lævis truncato-mutilata.*

"Pet. Gaz. t. 66. f. 1", and "Habitat in Arabia. Hasselquist. Santa Cruz. Petiv." were the unprinted additions. The entire account was in the handwriting of our author.

H. AMARULA. *Nerita edentula oblonga, anfractibus multifariam denticulatis.*

Our author was evidently puzzled as to the generic position of this peculiar-looking shell, for he has written "Habitum accedit ad *Volutas* *vespertilionis*, ore *Helicibus*, sed labium interius planum, et affinitas cum antecedenti fiat, ut hic relinquitur." The preceding shell alluded to was *N. corona*.

H. NERITOIDEA. *H. convexa longitudinaliter striata.*

The erroneous reference to Gualtieri was not present in the written copy.

H. PERSPICUA. *H. convexo-ovata, labio interiore nullo, apertura ad apicem usque pervia.*

The then unpublished details of both this and the preceding were referred to in the tenth edition of the 'Systema.' *Patens* was the proposed specific appellation.

H. HALIOTOIDEA. *H. depresso-planiuscula obtusissima, ore ovali dilatato.*

None of the cited figures were at first accepted by our author, who only added that of Rumphius to the earlier description, and wholly omitted the rest. "Transverse" preceded "striata".

NERITA.

Testa subrotunda, obtusa. Labium interius planum, transversim truncatum, depressum.

The generic arrangement was similar to that of the printed version.

N. CANRENA. *N. edentula umbilicata, spira mucronata, labio reflexo bifido.*

When Linnæus first described this shell, under the appellation of *N. musica*, he did not admit a single one of the cited figures as illustrative.

N. GLAUCINA. *N. edentula convexa, umbilico simplici semiclauso gibboso dicolore.*

None of the deceptive figures were at first referred to, but had been added at a subsequent period; and that of Rumphius again erased. *N. luteola* was the intended name.

N. ALBUMEN. *N. edentula subrotunda, umbilico teretiusculo.*

The present heading agrees with the subsequent details, which could not be affirmed of the printed one borrowed from the 'Systema.' The MS., in some degree, clears up the extraordinary confusion in which the Linnean species was enveloped. There were two *N. albumen* in the written copy. The shell here described (assuredly not the lobed *albumen* of the 'Systema') was originally termed *hepatica* or *luteola* (for both had been erased). The true *albumen* was described as "edentula subrotunda, umbilico subcordato."

labri interioris lobo explanato" and the only figure referred to was "Rumph. t. 22. f. B." "Klein 13. *Platystoma vitellum compressum*" was also mentioned. This description was suppressed, and the other species retained, with the erroneous designation, and the faulty synonymy, attached. Nor was this the only change. In order to include the *Natica vitellus* of authors ("Rumph. t. 22. f. A. *Valvata lævis prima s. vitellus*" had been quoted by our author) the "aut lutea", "aut maculis albis", had been added to the earlier description: so, likewise, had been "*Apertura rotundata, semicordata*", and "*glabrum, planiusculum, nitidum.*" I suspect, then, that whilst the ideal of the *albumen* of the 'Systema' was any hemispherical or flattened *Natica* with a labial lobe (such as *Nat. albumen, didyma, olla, &c.*), the *albumen* of the 'Museum', as printed, was composed of *Natica rufa* ("Rumph. 22. f. D." was quoted in the MS.) and *vitellus* (for A, not B, of Rumphius was the letter indicated in the MS.).

N. MAMMILLA. The entire account of this common shell was added in the Linnean handwriting. The inappropriate "aut lutea" was not at first present.

N. CORONA. *N. edentula, simplicis spira spinosa.*

"Pet. Amb. t. 3. f. 4.", a mere copy of the Rumphian figure, was also quoted. The 19 in the reference to d'Argenville was a misprint for the written 10. *N. spinosa* was the intended designation.

N. RADULA. *N. edentula sulcata, tuberculis æqualibus.*

The *valvata granulata* of Rumphius (t. 22. f. M.) was referred to as illustrative.

N. CORNEA. *N. edentula, obsolete striata.*

N. BIDENS. *N.*

"Obsoletis" followed "duobus": the name had been written subsequent to the description.

N. VIRGINEA. *N. subdentula ovata lævis.*

"Dentibus pluribus minutissimis" preceded "oris"; "Pet. Gaz. t. 11. f. 3" was in the place of the delusive figure of d'Argenville: the variety *d* was a subsequent addition.

N. POLITA. *N. lævis, labiis dentatis.*

The 1 in the synonym of Rumphius was a misprint for the written I.

N. PELERONTA. *N. striata, labiis dentatis, interiore planiusculo rugoso.*

The erroneous synonym was added, along with the name *peleronta*, to the written details: *N. rufa* was the original appellation.

N. ALBICILLA. *N. striata, labiis subdentatis, interiore tuberculato.*

N. HISTRIO. *N. sulcata, transversim striata, labio interiore dentato.*

The name, and the synonym, were added by Linnæus to the written details.

N. PLICATA. *N. sulcata, labiis profunde dentatis, interiore rotundato, exteriore utrinque dentibus acutis conicis.*

The variety alluded to was a subsequent addition. The details of the 'Museum' had been quoted, in anticipation, for this species.

N. GROSSA. *N. sulcata labiis dentatis, interiore convexo rugoso.*

N. CHAMÆLEON. *N. sulcata*, labiis dentatis, interiore rugoso tuberculato.

"Habitat in Banda", and "compositis" after "subtilissimis", are the unprinted additions.

N. UNDATA. *N. sulcata*, labiis dentatis, interiore rugoso, tuberculato.

The erroneous figure of Gualtieri was not cited when the description was drawn up, but added to the details, along with "confluentibus. Spira acuta prominens", when the present name was substituted for the earlier *nebulata*.

N. EXUVIA. *N. sulcata*, labiis dentatis, interiore denticulato.

HALIOTIS.

Testa univalvis, patens, convexa. Spira obsoleta, lateralis. Foramina lateralia pervia.

H. MIDÆ. *H. subrotunda*, utrinque nitida.

Humana was the intended specific appellation.

H. TUBERCULATA. *H. subovata*, rugis transversis tuberculatis.

The reference to Lister was an emendation.

H. STRIATA. *H. ovata*, transversim rugosa, longitudinaliter striata.

No name was attached to either this or any member of the genus, except the first.

H. VARIA. *H. ovata*, striis longitudinalibus, majoribus tuberculatis.

H. MARMORATA. *H. ovata*, striis longitudinalibus, transversis obsoletis.

H. ASININA. *H. oblonga*, extra foramina angulata, striis elevatis.

H. PARVA. *H. ovata*, angulo inter foramina et spiram.

All the headings in this genus are similar to those in the 'Systema'.

PATELLA.

Testa conica, convexa. Spira regularis nulla vera.

The limits of this genus were precisely those of the printed edition.

P. EQUESTRIS. *P. ungue fornicali nutante*.

P. NERITOIDEA. *P. integra ovata*, apice subspirali, labio laterali.

"Supra" preceded "convexa", and the "fere" was before "apice".

P. CHINENSIS. *P. conica latior lævis*, labio interno laterali.

This was an addition to the original catalogue.

P. PORCELLANA. *P. basi interne labiata*, pone mucronato-subspiralis.

P. CREPIDULA was not mentioned in the manuscript.

P. SACCHARINA. *P. margine sinuato*, carinata, costis 7.

"Pet, Amb. t. 3. f. 3", and "Klein 117. t. 8. f. 4", were additional synonyms: both are in the 'Systema.'

P. BARBARA. *P. dentata*, costis 19 elevatis.

P. GRANULARIS. *P. margine dentato*, striis elevatis mucronibus imbricatis.

The erroneous reference to Gualtieri was not in the original.

P. GRANATINA. *P. margine angulato*, striis 11 lævibus.

"Interius" was the earlier reading of "subtus".

P. TUBERCULATA. *P. dentata conica tuberculata, postice sima.*

Sima was the earlier name in the MS., but was erased by Linnæus.

P. LUTEA. *P. integerrima striata, vertice mucronato inflexo.*

P. UNGUIS. *P. ovali-oblonga, apice emarginata, mucrone dorsali carinato.*

Unguisformis was the intended appellation.

P. TESTUDINARIA. *P. ovata glaberrima integerrima.*

P. RUSTICA. *P. integra, striis 50 obtusiusculis.*

P. FUSCA. *P. ovata integerrima, striis elevatis, vertice obtuso.*

The intended name was *cinereo-nigricans*.

P. CRUCIATA. *P. ovalis convexa integerrima, cruce picta.*

P. RETICULATA. *P. conica compressa, superficie reticulata.*

The suggestion I have elsewhere made that this uncertain shell might prove the European *Pedicularia*, induces me to remark that, although *P. Sicula* has been supposed to be a comparatively modern discovery, Favanne had long ago delineated it in the fourth plate (f. H. 1.) of his enlarged edition of d'Argenville.

P. NIMBOSA. *P. conica ovalis, costis confertis, vertice perforato.*

The discrepancy between the heading borrowed from the 'Systema', and the after details, is removed by the substitution of the original one. The shell was termed *perforata* (not *nimbosa*), and was wrongly identified by Linnæus with the striated brown *Fissurella* of the 'Systema'.

In addition to the printed species, the two following were present in the manuscript copy.

P. SOLARIS. *P. ovata integerrima, striis subnodosis, vertice acutiusculo.*

Testa ovata, diaphana, magnitudine extimi articuli digiti, margine integerrimo, lævis, striis subtilissimis inæqualibus numerosissimis, fasciis longitudinalibus rubris albo passim maculatis. Mucro acutiusculus obliquus albidus.

This was placed in the section having a simple margin.

P. PERFOLIATA. *P. conica, reclinata, perfoliata.*

Testa magnitudine coryli nucis, conica, sed cono retro inclinato, acutissima, alba, imbricata lamellis horizontaliter testam cingentibus. Margo integer, ovalis, antrorsum gibbus s. dilatatus. Cavitas profunde glabra.

This description very fairly suits the *Patella antiquata* of the twelfth edition of the 'Systema'.

DENTALIUM.

Testa univalvis, subcylindrica, utrinque aperta. Spira regularis nulla.

Although the *Serpula* were intermingled, it is clear that they did not accord with the above definition.

D. ELEPHANTINUM. *D. subulatum subarcuatum, angulatum.*

The synonymy of the tenth edition was appended, Lister excepted; the erroneous 13 of the reference to the Gazophylaceum was erased. *Dens elephantis* was the proposed trivial name.

ciatis, tarsi postici albo unifasciatis, pectore argenteo, abdomine cyaneo fasciculis lateralibus albis subapicalibus nigris apicalibus auratis, alis subcinereis apud costam nigricantibus.

Male. Black. Head and thorax with green metallic scales; disc of the latter with cupreous scales. Proboscis, palpi, and legs purple; femora tawny beneath; middle tarsi with two white bands; hind tarsi with one white band. Pectus silvery. Abdomen blue, widening from the base to the tip, with small white tufts of hairs along each side; four larger black subapical tufts, two gilded apical tufts. Wings slightly greyish, blackish along the costa; veins black. Length of the body 5 lines; of the wings 8 lines.

Gen. *CULEX*, *Linn.*

2. *CULEX* *OBTURBANS*, n. s. *Fem.* Nigricans, thoracis disco fusco, abdomine cupreo apice viridescente, gutta subapicali alba, fasciis ventralibus latis albis, pedibus subcupreo squamosis, femoribus subtus albis, alis cinereis.

Female. Blackish. Proboscis pale; its sheaths dark, longer than the thorax. Disk of the thorax with brown tomentum. Abdomen with cupreous tomentum, and with a slight greenish tinge towards the tip; a white subapical dot; underside with broad white bands. Legs with a cupreous tinge; femora whitish beneath. Wings grey; veins black, fringed. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

3. *CULEX* *IMPATIBILIS*, n. s. *Mas.* Subcupreo-niger, capite albo punctato, pectore albo guttato, abdomine fasciis interruptis albis, genubus albis, femoribus posticis albis apice nigris, tarsis intermediis basi albis, tarsis posticis albo bifasciatis, alis cinereis.

Male. Black, with a very slight cupreous tinge. Head with shining white points. Sheaths of the proboscis dark tawny, longer than the thorax. Pectus with shining white dots. Abdomen with interrupted shining white bands, which are most complete beneath. Knees white; hind femora white, with black tips; middle tarsi white at the base; hind tarsi with two white bands. Wings cinereous; veins black, fringed. Length of the body 2 lines; of the wings 3 lines.

4. *CULEX* *IMPELLENS*, n. s. *Fem.* Fuscus, subtus testaceus, proboscide nigricante albo-fasciato, pedibus pallidis, femoribus albidis apice obscurioribus, tarsorum articulis basi albis, alis cinereis.

Female. Brown, testaceous beneath. Proboscis blackish, with a white band, a little longer than the thorax. Legs with pale reflections; femora whitish, with darker tips; joints of the tarsi white at the base. Wings grey; veins black, fringed. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. *ANOPHELES*, *Meigen.*

5. *ANOPHELES* *VANUS*, n. s. *Mas.* Cinereo-fuscus, gracilis, antennis

late plumosis, pedibus testaceis longis gracillimis, tarsorum articulis basi albis, alis subcinereis antice nigro punctatis.

Male. Cinereous brown, slender. Proboscis full half the length of the body. Palpi nearly half the length of the body. Antennæ broadly plumose. Legs testaceous, long, very slender; joints of the tarsi white at the base. Wings slightly cinereous, with black points on the fore part; veins black, fringed. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Fam. TIPULIDÆ, *Haliday.*

Gen. LIMNOBIA, *Meigen.*

The following species, in the structure of the wing-veins, does not accord with any of Meigen's divisions of the genus. The mediastinal vein ends at about three-fourths of the length of the wing; the subcostal ends at seven-eighths of the length, and is connected with the radial by a transverse veinlet at its tip; the radial, the cubital, and the 1st and the 3rd externo-medial are long and of equal length; the 2nd externo-medial springs from the 1st, at one-fourth of its length; the 3rd externo-medial is connected by a transverse veinlet near its base with the subanal.

6. LIMNOBIA IMPONENS, n. s. Ochracea, palpis antennisque nigricantibus, his thoracis dimidio brevioribus, thorace antico valde elongato et attenuato, abdomine piceo, alis subcinereis longis angustis, stigmatibus nigricante longissimo, halteribus piceis basi testaceis.

Ochraceous. Proboscis, palpi, and antennæ blackish, the latter moniliform setaceous, not half the length of the thorax. Thorax much elongated and attenuated in front. Abdomen piceous. Wings greyish, long narrow; veins black, testaceous at the base and along the costa from the base to the stigma, which is blackish and very long; halteres piceous, testaceous at the base. Length of the body 7 (?) lines; of the wings 16 lines.

Gen. TIPULA, *Linn.*

7. TIPULA INFIDENS, n. s. *Fem.* Fusca, capite apud oculos subtusque cinereo, antennis basi testaceis thorace brevioribus, thorace vittis quatuor ochraceis, abdominis apice ochraceo, pedibus fulvis longissimis, femoribus apice fuscis, alis cinereis apud costam luridis.

Female. Brown. Head cinereous about the eyes and beneath. Antennæ setaceous, submoniliform, testaceous at the base, shorter than the thorax. Thorax with a slight cinereous tinge, and with four dull ochraceous stripes. Abdomen ochraceous at the tip. Legs tawny, slender, very long; tips of the femora brown. Wings cinereous, lurid along the costa to the stigma, which is brown; veins black, tawny at the base. Length of the body 10 lines; of the wings 24 lines.

8. *TIPULA INORDINANS*, n. s. *Mas.* Fusca, capite pallide cinereo vitta fusca, antennis testaceis thorace valde longioribus, articulis basi nigris nodosis setigeris thorace vittis quatuor pallide cinereis, abdominis lateribus ventrequae testaceis, segmentis basi nigro postice albo-marginatis, pedibus nigris longissimis, femoribus dimidio basali testaceis apices versus albo fasciatis, tibiis albo fasciatis, tarsis albo bifasciatis, alis hyalinis striga costali subapicali nigricante, venis transversis nigro nebulosis.

Male. Brown. Head pale cinereous, with a brown stripe. Antennæ testaceous, slightly setaceous, much longer than the thorax; joints at the base black, nodose, setigerous. Thorax with four pale cinereous stripes; pectus pale cinereous. Abdomen testaceous beneath and along each side, thickened towards the tip; segments whitish at the base, black along the hind borders. Legs black, slender, very long; femora testaceous for half the length from the base, with a white subapical band; tibiæ with a white band beyond the middle; tarsi with two broad white bands. Wings hyaline, with a blackish costal subapical streak; veins and stigma black, the latter small; transverse veins and forked subapical vein clouded with black; veins testaceous. Length of the body 9 lines; of the wings 16 lines.

Gen. CTENOPHORA, *Fabr.*

9. *CTENOPHORA INCUNCTANS*, n. s. *Mas.* Atra, capite thoraceque læte ochraceis, antennarum ramis longis æqualibus subpilosis, abdomine basi ochraceo. *Fem.* Thoracis disco saturate ochraceo. *Var. β.* Capite thoraceque saturate ochraceis, alis albidis strigatis et guttatis.

Deep black. *Male.* Head and thorax bright ochraceous. Antennæ with long equal slightly pilose branches. Abdomen ochraceous at the base. *Female.* Disc of the thorax deep ochraceous. *Var.* Head and thorax deep ochraceous. Wings with five whitish streaks and two exterior elongated whitish dots. Length of the body 8–10 lines; of the wings 18–22 lines.

10. *CTENOPHORA GAUDENS*, n. s. *Mas et Fem.* Læte ochracea, abdomine apicem versus nigro, pedibus nigris, femoribus ochraceis apice nigris, tibiis fascia basali candida, alis nigricantibus basi ochraceis, fascia exteriore albida.

Male and Female. Bright ochraceous. Abdomen black towards the tip. Legs black; femora ochraceous, black towards the tips; tibiæ with a snow white basal band. Wings blackish, ochraceous at the base, with a whitish exterior band which is attenuated hindward. *Male.* Antennæ with long, equal, slightly pilose branches. Length of the body 7–10 lines; of the wings 14–16 lines.

Fam. STRATIOMIDÆ, *Haliday*.Gen. PTILOCERA, *Wied.*11. *Ptilocera smaragdina*. *Walk. Dipt.* pt. 3. 525.

Inhabits also the Philippine Islands.

12. *PTILOCERA SMARAGDIFERA*, n. s. *Mas.* Nigra, thorace pubescente vittis duabus smaragdinis, lateribus purpurascens, abdomine nigricanti-cyaneo squamis lateralibus viridibus, tarsis basi obscure rufescentibus, alis subhyalinis, dimidio basali antice nigricante postice cinereo.

Male. Black. Thorax thickly pubescent, purplish along each side, with two emerald green dorsal stripes. Abdomen blackish blue, with green scales along each side. Tarsi dark reddish towards the base. Wings nearly hyaline; basal half blackish in front, cinereous hindward; veins black, yellow along the costa exteriorly. Length of the body 5 lines; of the wings 8 lines.

Gen. HERMETIA, *Latr.*13. *HERMETIA REMITTENS*, n. s. *Mas et Fœm.* Nigra, capite antico livido, antennis basi subtus lividis apice albis, thorace vittis tribus cinereis, abdomine seneo-nigro, tibiis basi tarsisque albidis, alis nigricantibus basi subhyalinis. *Mas.* Abdominis dimidio basali livido.

Male and Female. Black. Head livid in front; a whitish line along the eye on each side of the front. Antennæ livid beneath towards the base; apical joint elongate-fusiform, white at the tip, as long as all the other joints together. Thorax with 3 indistinct cinereous stripes. Abdomen slightly bronzed, livid for half the length from the base in the male. Tibiæ at the base and tarsi whitish. Wings blackish, nearly hyaline at the base; halteres livid. Length of the body 78 lines; of the wings 12-14 lines.

Gen. STRATIOMYS, *Geoffr.*14. *STRATIOMYS IMMISCENS*, n. s. *Mas.* Nigra, antennis fulvis parvis, scutelli margine postico spinisque pallide flavis, abdomine pallide flavo fasciis tribus dorsalibus latis nigris postice excavatis, pedibus flavescentibus, femoribus tibiisque nigro fasciatis, tarsis nigris, alis limpidis.

Male. Black. Head beneath and thorax with whitish down. Antennæ tawny, short. Scutellum along the hind border and spines pale yellow. Abdomen pale yellow, with three broad black dorsal bands, whose hind borders are much indented. Legs yellowish; femora and tibiæ with black bands; tarsi black. Wings limpid; veins brown; halteres pale. Length of the body 6 lines; of the wings 10 lines.

15. *STRATIOMYS FINALIS*, n. s. *Fœm.* Nigra, aureo-tomentosa, capite

subtus fulvo, antennis fulvis parvis, thorace vittis tribus nigris, thoracis margine postico spinisque pallide flavis, abdomine fulvo, pedibus pallide fulvis, alis limpidis.

Female. Black with gilded tomentum. Head tawny beneath, with two more or less tawny calli above the antennæ, which are tawny and short. Thorax with three black stripes; scutellum with the hind border and the spines pale yellow. Abdomen tawny, paler beneath. Legs pale tawny. Wings limpid; veins tawny; stigma testaceous. Length of the body 4 lines; of the wings 8 lines.

Gen. CLITELLARIA, *Meigen*.

16. *CLITELLARIA FESTINANS*, n. s. *Mas.* Nigra, aureo-tomentosa, antennis rufescenti-fulvis apices versus nigris, thorace fascia vittisque duabus aureis, scutelli spinis apice rufescenti-fulvis, abdomine vittis tribus macularibus aureis, pedibus luteis, alis luteis postice cinereis apice nigricantibus.

Male. Black, thick, with gilded down. Antennæ nearly as long as the breadth of the head; scape reddish tawny, fusiform, longer than the flagellum, which is black and lanceolate. Thorax and pectus with an interrupted downy band; thorax with two downy stripes, and with two lateral black spines; scutellum with a downy border, and with two stout spines, whose tips are reddish tawny. Abdomen with three rows of downy spots; the middle spots triangular; the lateral spots oblique. Legs and halteres luteous. Wings luteous along the costa, cinereous hindward, where the veins are bordered with black; tips broadly blackish; a black dot adjoining the luteous stigma. Length of the body 6 lines; of the wings 12 lines.

Fem.? Nigra, cinereo-tomentosa, antennis scapo intus fulvo, thoracis vittis duabus abdominisque maculis cinereis, femoribus tibiisque albidis apices versus nigris, tarsis basi albidis, alis obscure cinereis fascia lata subapicali nigricante.

Female? Black. Head shining, with white tomentum about the eyes. Antennæ shorter than the breadth of the head; scape linear, tawny on the inner side, much shorter than the flagellum, which is lanceolate. Thorax with two stripes of cinereous tomentum and with two lateral spines; scutellum with two stout spines; pectus with silvery cinereous tomentum. Abdomen with cinereous tomentose spots, which are disposed in three rows. Femora and tibiae whitish black towards the tips; tarsi whitish at the base. Wings dark grey, with a broad blackish subapical band; veins and stigma black; halteres whitish. Length of the body 5 lines; of the wings 10 lines.

17. *CLITELLARIA GAVISA*, n. s. *Mas.* Nigra, albedo-tomentosa, antennis testaceis apices versus nigris, thorace vittis duabus aureis, scutelli spinis apice flavis, abdomine vittis tribus macularibus aureis, pedibus flavis apices versus nigricantibus.

Male. Black, with whitish down. Antennæ shorter than the breadth of the head; scape testaceous, longer than the flagellum, which is

pilose. Thorax with two stripes of gilded tomentum, and with two lateral spines; spines of the scutellum yellow towards their tips. Abdomen with three rows of gilded tomentose spots, the dorsal spots triangular; the lateral spots oblique. Legs yellow; tarsi black towards the tips. Wings cinereous, blackish towards the tips and about the transverse veins; veins black, yellow towards the base; halteres yellow. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.
Fem. ? Cinereo-tomentosa, thoracis vittis abdominisque maculis cinereis, pedibus albidis, femoribus tibiis tarsisque apice nigris alis cinereis, fascia subapicali nigricante.

Female? With cinereous tomentum. Head white and shining about the eyes. Stripes of the thorax and spots of the abdomen cinereous. Legs whitish; femora, tibiae and tarsi black towards the tips. Wings cinereous with a blackish subapical band.

Gen. OXYCERA, *Meig.*

18. OXYCERA MANENS, n. s. *Mas et Fem.* Nigra, cinereo-subtomentosa, antennis fulvis, pedibus pallide fulvescentibus aut lividis, alis vix cinereis. *Mas.* Thorace aureo-subtomentoso.

Male and Female. Black, slightly covered with cinereous tomentum. Head white and shining about the eyes. Antennae tawny. Thorax of the male slightly covered with gilded tomentum. Legs dull pale tawny or livid; hind tibiae black. Wings hardly cinereous; veins and stigma pale in the male, black in the female. Length of the body 3 lines; of the wings 7 lines.

Gen. SARGUS, *Fabr.*

19. SARGUS REPENSANS, n. s. *Mas.* Testaceus, pubescens, vertice nigro, palpis lanceolatis, arista nigra, tibiis tarsisque posticis nigris, his albo cinctis, tarsis anterioribus apice nigris, alis cinereis apices versus nigricantibus.

Allied to *S. AURIFER.*

Male. Testaceous, pubescent. Vertex black. Palpi lanceolate, extending along two-thirds of the space between the mouth and the antennae; arista black. Hind tibiae and hind tarsi black, the latter white towards the tips, which are black; anterior tarsi with black tips. Wings cinereous, blackish towards the tips; veins black, testaceous at the base. Length of the body 9 lines; of the wings 20 lines.

20. SARGUS REMEANS, n. s. *Fem.* Niger, pubescens, thorace purpurascente-nigro, vittis duabus lateralibus pectoris disco tibiisque anterioribus supra sordide albidis, alis nigricantibus. *Mas.?* Antennis piceis, thorace purpurascente-cupreo, pectore livido, abdominis segmentis albido-marginatis, alis fuscis, cinereis extus albido-striatis.

Allied to *S. TENEBRIFER.*

Female. Black, pubescent. Head wanting. Thorax purplish black, with a dingy whitish stripe along each side; disk of the pectus dingy whitish. Anterior tibiae dingy whitish above. Wings blackish; veins black; halteres dingy whitish, with blackish knobs. Length of the body 9 lines; of the wings 20 lines.

Male? Black. Head whitish about the mouth. Antennæ piceous. Thorax purplish cupreous, with a dingy whitish stripe along each side; pectus livid. Abdomen with two lanceolate apical appendages; hind borders of the segments whitish. Wings brownish cinereous, with slight whitish streaks on the exterior areolets. Length of the body 7 lines; of the wings 16 lines.

21. *SARGUS REDHIBENS*, n. s. *Fæm.* Cyaneus, antennis fulvis, thoracis lateribus anticis purpurascens, abdomine purpureo, pedibus albidis, tibiis posticis femoribusque nigricante strigatis, alis cinereis. *Var. β.* Vertice purpureo, thorace viridi.

Female. Blue. Antennæ tawny. Thorax purplish on each side in front. Abdomen purple, much broader than the thorax. Legs whitish; femora with a blackish streak above towards the tips; hind tibiae with a blackish apical streak. Wings cinereous; veins black; stigma blackish. Halteres tawny. *Var. β.* Vertex purple. Thorax green. Length of the body $3\frac{1}{4}$ –4 lines; of the wings 7–9 lines.

This may be a local variety of *S. metallinus*, but differs from that species by the dark marks on its hind legs, and by the wing-veins being black at the base.

22. *SARGUS MACTANS*, n. s. *Fæm.* Cupreo-viridis, abdomine cupreo, pedibus testaceis, tibiis posticis basi nigris, alis cinereis apices versus obscurioribus.

Female. Cupreous green, with cinereous down. Head wanting. Abdomen cupreous. Legs testaceous; hind tibiae black for half the length from the base. Wings cinereous, darker from the discal areolet to the tips; veins black; stigma brown; halteres testaceous. Length of the body $4\frac{1}{4}$ lines; of the wings 10 lines.

23. *SARGUS INACTUS*, n. s. *Mas.* Albido-testaceus, vertice nigro, thoracis disco scutellique apice purpureis, pectore maculis duabus cupreis, alis cinereis.

Male. Whitish testaceous. Vertex black. Disk of the thorax and scutellum towards the tip purple; pectus with a cupreous spot on each side. Wings cinereous; veins black; stigma dark brown; discal areolet shorter than that of the two preceding species. Length of the body 5? lines; of the wings 10 lines.

Gen. NERNA, Walk.

24. *NERNA IMPENDENS*, n. s. *Mas et Fæm.* Nigra, cinereo-subtomentosa, antennis tarsis posterioribus halteribusque testaceis, tarsi LINN. PROC.—ZOOLOGY.

anticis tibiisque piceis, alis cinereis apud costam exteriorem nigricantibus.

Male and Female. Black, with very slight cinereous pubescence. Antennæ, posterior tarsi, and halteres testaceous; tibiae and fore tarsi piceous. Wings cinereous, blackish along the exterior part of the costa; veins and stigma black. Length of the body $3\frac{1}{4}$ lines; of the wings 6 lines.

Gen. SOLVA, n. g.

Corpus lineare. *Proboscis* lanceolata. *Palpi* porrecti, lineares, caput non superantes. *Antennæ* lanceolatae. *Scutellum* inerme. *Abdomen* thorace longius. *Pedes* breviusculi, femoribus posticis incrassatis subserratis. *Alæ* sat angustæ.

Body linear. Head not broader than the thorax. Proboscis lanceolate. Palpi porrect, linear, rounded at the tips, not extending beyond the head. Antennæ lanceolate, shorter than the breadth of the head; joints indistinct. Thorax with a humeral callus and a linear callus on each side. Scutellum unarmed. Abdomen rather longer than the thorax. Legs rather short; hind femora incrassated, minutely serrated beneath; hind tibiae very slightly curved, applied to the femora. Wings rather narrow; 1st and 2nd cubital veins rather long; length of the discal areolet more than thrice its breadth; 3rd and 4th externo-medial veins connected towards the border; anal and subanal veins connected at some distance from the border.

25. SOLVA INAMENA, n. s. *Fem.* Cinereo-nigra, palpis, thoracis callis, scutello, abdominis lateribus, ventre pedibusque testaceis, antennis testaceis apice nigris, abdominis segmentis testaceo marginatis, alis subeineris.

Female. Cinereous black. Mouth, palpi, calli of the thorax, scutellum, abdomen beneath and along each side except at the base, legs, and halteres testaceous. Antennæ testaceous except towards the tips. Hind borders of the abdominal segments testaceous. Wings greyish; veins black, testaceous towards the base. Length of the body $2\frac{1}{4}$ -3 lines; of the wings 5-6 lines.

Gen. AMPSALIS, n. g.

Fem. *Corpus* elongatum, sublineare. *Antennæ* filiformes; flagellum lineare. *Thorax* longi-ellipticus; scutellum bispinosum. *Abdomen* ellipticum, thorace paullo latius non longius. *Pedes* longiusculi. *Alæ* angustæ.

Female. Body elongate, nearly linear. Head a little broader than the thorax. Eyes prominent. Palpi very short. Antennæ filiform, much longer than the breadth of the head; flagellum linear, about twice the length of the scape; joints indistinct. Thorax elongate-elliptical; scutellum armed with two obliquely ascending spines. Abdomen

elliptical, a little broader but not longer than the thorax. Legs rather long. Wings narrow; 1st cubital vein about one-fourth the length of the 2nd; four externo-medial veins complete; subanal vein curved, joining the anal vein at some distance from the border; discal areolet elongated and attenuated exteriorly; exterior side very short.

26. *AMPSALIS GENIATA*, n. s. *Fem.* Ferrugineo-fusca, antennis nigris basi fulvis, thorace vittis duabus testaceis, scutello testaceo, apice spinisque et pectoris disco nigris, abdomine nigro, basi vittis duabus interruptis lateralibus pedibusque testaceis, alis cinereis apices versus fusciscentibus.

Female. Ferruginous brown. Antennæ black, tawny towards the base. Thorax with two testaceous stripes; scutellum testaceous; tip and spines black. Disk of the pectus black. Abdomen black; base and an interrupted stripe along each side testaceous. Legs and halteres testaceous. Wings grey, brownish in front towards the tips; veins black, testaceous at the base; stigma testaceous. Length of the body 6 lines; of the wings 11 lines.

Gen. *TRACANA*, n. g.

Mas et Fem. *Corpus* elongatum. *Proboscis* lanceolata. *Antennæ* graciles, filiformes, capite transverso vix breviores. *Thorax* longi-ellipticus; scutellum bispinosum. *Abdomen* thorace paullo longius et latius. *Pedes* longiusculi. *Alæ* longæ, non latæ.

Male and Female. Body elongate. Head rather broader than the fore part of the thorax. Mouth lanceolate; palpi very short. Antennæ slender, filiform, about as long as the breadth of the head; 3rd joint long; 4th and following joints shorter. Thorax elongate-elliptical, with a distinct linear callus along each side; scutellum armed with two obliquely ascending spines. Abdomen elongate-elliptical, most attenuated towards the base, a little broader and longer than the thorax. Legs rather long. Wings long, not broad; 1st subcubital vein hardly one-third the length of the 2nd; four externo-medial veins complete; subanal vein curved, joining the anal vein near the border; discal areolet oblong, narrower exteriorly; exterior side very short.

27. *TRACANA ITERABILIS*, n. s. *Mas et Fem.* Cinereo-nigra, capite antico fulvo, antennis albido-flavis basi nigricantibus, pedibus fulvis, tibiis posticis femoribusque nigro-fuscatis, alis cinereis apices versus nigricantibus. *Mas.* Abdomine fulvo maculis lateralibus nigris. *Fem.* Abdominis basi lateribusque fulvis.

Male and Female. Cinereous black. Head in front and calli of the thorax tawny. Antennæ whitish yellow, blackish at the base. Legs tawny; femora and hind tibiæ banded with black. Wings grey, blackish towards the tips; veins black; halteres tawny. *Male.* Abdomen tawny, with some black spots on each side. *Female.* Abdomen tawny

at the base and along each side. Length of the body 5 lines; of the wings 10 lines.

Gen. ROSAPHA, n. g.

Mas et Fœm. Corpus angustum, elongatum, lineare. *Antennæ* graciles, filiformes, capite transverso longiores; articulus 3^m fusiformis. *Scutellum* spinis duabus longis acutis armatum. *Abdomen* thorace vix longius aut latius. *Pedes* breves. *Alæ* angustæ.

Male and Female. Body narrow, elongated, linear. Mouth and palpi extremely short. *Antennæ* slender, filiform, longer than the breadth of the head; 3rd joint long, fusiform; joints of the flagellum indistinct. Thorax nearly linear, a little narrower in front; scutellum armed with two long, acute, hardly ascending spines. Abdomen subfusiform, narrowest towards the base, very little broader and longer than the thorax. Legs short. Wings narrow; 1st cubital vein nearly half the length of the 2nd; three complete externo-medial veins; subanal vein curved, joining the anal vein at some little distance from the border; discal areolet oblong; exterior side short.

28. ROSAPHA HABILIS, n. s. *Mas et Fœm.* Fulva, capite antennisque nigris, his basi fulvis, thoracis macula antica elongata, spinis apice, tibiis posticis apices versus tarsisque anterioribus nigris, tarsis posticis albis apice nigris, alis cinerascentibus apices versus nigris. *Fœm.* Abdomine supra nigro, basi lateribusque fulvis.

Male and Female. Tawny. Head black, white beneath along the eyes. *Antennæ* black; 1st, 2nd, and 3rd joints tawny. Thorax with an elongated black spot in front; spines of the scutellum black towards the tips. Hind tibiæ towards the tips and anterior tarsi black; hind tarsi white with black tips. Wings greyish, blackish in front towards the tips; veins black, tawny at the base; stigma ferruginous brown. *Female.* Abdomen black above, except at the base and along each side. Length of the body 3½ lines; of the wings 7 lines.

Gen. RUBA, n. g.

Fœm. Corpus breve, crassum, latum. Caput parvum. *Antennæ* capite transverso vix breviores. *Scutellum* inerme. *Abdomen* globosum, thorace valde latius. *Pedes* breves. *Alæ* mediocres.

Female. Body thick, short, broad. Head much narrower than the thorax. Proboscis and palpi very short. *Antennæ* nearly as long as the breadth of the head; 3rd joint broader and longer than the flagellum, of which the joints are short, compact, and minutely setulose. Thorax a little longer than broad; scutellum unarmed. Abdomen globose, very much broader and a little longer than the thorax. Legs short. Wings moderately broad; 1st cubital vein not one-third of the length of the 2nd; four complete externo-medial veins; subanal

vein curved, joining the anal vein at some distance from the border ; discal areolet elongated exteriorly, irregularly triangular ; exterior side very short.

29. *RUBA INFLATA*, n. s. *Mas.* Testacea, valde pubescens, capite subtus guttis duabus nigris, alis sub-cinereis apices versus fuscescens, stigmatibus, flavescens.

Male. Testaceous. Head with a black dot on each side of the mouth. Flagellum of the antennæ black. Thorax and abdomen very pubescent. Wings slightly greyish, brownish towards the tips, and especially so in front ; veins black, testaceous at the base ; stigma yellowish. Length of the body 4 lines ; of the wings 7 lines.

Gen. *TINDA*, n. g.

Fem. *Corpus* longiusculum, depressum. *Caput* oblongum, margine postico elevato. *Antennæ* capite transverso vix breviores ; articulus 3^{us} fusiformis ; flagellum compressum, lanceolatum. *Scutellum* spinosum. *Abdomen* ellipticum, thorace latius non longius. *Pedes* breves, graciles. *Alæ* angustæ.

Female. Body somewhat elongated and depressed. Head somewhat oblong ; eyes nearly contiguous in front, diverging hindward, where there is an elevated margin. Mouth and palpi very short. Antennæ nearly as long as the breadth of the head ; 3rd joint fusiform, fully half the length of the flagellum, which is compressed and lanceolate, and with indistinct joints. Thorax slightly widening hindward ; scutellum with six ? very minute spines. Abdomen elliptical, broader but not longer than the thorax. Legs short, slender. Wings narrow ; 1st cubital vein less than one-third the length of the 2nd ; three complete externo-medial veins ; subanal vein joining the anal vein at some distance from the border ; discal areolet elongated, its exterior side very short.

30. *TINDA MODIFERA*, n. s. *Fem.* Nigra, antennis basi testaceis, pedibus testaceis, femoribus posterioribus supra obscurioribus, alis cinereis costam versus subnigricantibus.

Female. Black, hardly shining. Antennæ testaceous towards the base. Legs testaceous ; posterior femora somewhat darker above, except towards the base. Wings grey, slightly blackish along most of the costa ; veins black ; halteres testaceous. Length of the body 3 lines ; of the wings 5 lines.

Gen. *SARUGA*, n. g.

Mas. *Corpus* contractum, breve, latum, crassum. *Vertex* gibbosus. *Oculi* magni. *Antennæ* brevissimæ ; articulus 3^{us} rotundus ; arista apicalis, gracillima. *Thorax* gibbosus ; *scutellum* elevatum, conicum, postice productum. *Abdomen* transversum, thorace brevius. *Pedes* breves, graciles, simplices. *Alæ* breviusculæ.

Male. Body contracted, short, broad, thick. Head almost as broad as the thorax; vertex gibbous; eyes large, bare; mouth extremely short and small; antennæ very short, 3rd joint round; arista apical, very slender, a little longer than the antennæ; thorax gibbous; scutellum very gibbous, forming an upright cone, somewhat gibbous and conical hindward, where it is horizontal; abdomen a little broader than long, much shorter than the thorax; legs short, slender, simple; wings rather short; veins in structure like those of *Oxycera*.

31. *SARUGA CONIFERA*, n. s. *Mas.* Anthracina, antennis pedibusque albedo-testaceis, thorace maculis duabus magnis flavo-tomentosis, femoribus nigris, genibus fulvis, alis albidis.

Male. Coal-black; antennæ and legs whitish testaceous; thorax with a large yellow tomentose spot on each side in front of the scutellum; femora black; knees tawny; wings whitish vitreous; veins and stigma whitish testaceous, the former black towards the base. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Fam. TABANIDÆ, *Leach*.

Gen. TABANUS, *Linnaeus*.

32. *TABANUS SUCCURVUS*, n. s. *Fem.* Nigricanti-fuscus, capite ferrugineo, callo longo lanceolato gracillimo, palpis piceis, antennis nigris, segmentorum abdominalium marginibus posticis subpallidioribus, tibiis subtus rufescenti-piceis, alis obscure cinereis apud venas fuscescentibus.

Female. Blackish brown. Head ferruginous, with a long lanceolate and very slender callus between the nearly contiguous eyes; under side clothed with black hairs. Proboscis black. Palpi piceous. Antennæ black; 3rd joint with a small horn. Hind borders of the abdominal segments slightly paler in the middle. Tibiæ reddish piceous beneath. Wings dark grey, brownish about the veins towards the base; veins black, piceous towards the base; fore branch of the cubital vein simple, nearly straight; halteres ferruginous, with luteous knobs. Length of the body 11 lines; of the wings 22 lines.

33. *TABANUS FACTIOSUS*, n. s. *Fem.* Nigricanti-fuscus, capite testaceo, callo nigro gracili lanceolato, palpis piceis, thorace cinereo, abdomine rufescenti-piceo, maculis dorsalibus trigonis albidis, segmentorum ventralium marginibus posticis testaceis.

Female. Blackish brown. Head with testaceous tomentum and with a slender lanceolate black callus between the eyes. Proboscis black; palpi piceous. Antennæ with a very small horn. Thorax with cinereous down; pectus paler and more thickly clothed with paler down. Abdomen reddish piceous, with a whitish triangular spot on the hind border of each segment; hind borders of the ventral segments testaceous. Legs piceous; femora black; tibiæ tawny beneath. Wings grey, with a brownish tint in front; veins black, ferruginous towards

the base; fore branch of the cubital vein simple, nearly straight; halteres ferruginous, with whitish-yellow knobs. Length of the body 10 lines; of the wings 22 lines.

34. *TABANUS REDUCENS*, n. s. *Fam.* Cinereo-niger, capite albido, callo nigro longo clavato, palpis albidis, antennis nigris vix dentatis, thorace vittis quatuor cinereis, abdomine vittis tribus albidis, segmentis ventralibus albido marginatis, tibiis fulvis apice nigris, alis cinereis striga subcostali nigricante, halteribus piceis apice testaceis.

Female. Cinereous black. Head whitish, clothed with white hairs beneath; callus black, long, clavate; palpi whitish; antennæ black, with an extremely small tooth; thorax with four cinereous stripes; pectus cinereous; abdomen with three whitish stripes, the dorsal one much more conspicuous than the lateral pair; hind borders of the ventral segments whitish; tibiæ tawny with black tips. Wings cinereous, with a blackish sub-costal streak; veins black; fore branch of the cubital vein simple, nearly straight; halteres piceous, with luteous knobs. Length of the body 10 lines; of the wings 20 lines.

35. *TABANUS SPOLIATUS*, n. s. *Mas.* Cinereo-niger, albido tomentosus, capite cinereo, palpis testaceis, antennis nigris basi rufescentibus vix dentatis, thoracis lateribus fulvescentibus, abdomine rufescente maculis dorsalibus trigonis albidis, segmentis ventralibus albido marginatis, tibiis rufescentibus nigro lineatis, alis cinereis apud costam fuscescentibus, halteribus albidis.

Allied to *T. UNIVENTRIS* and to *T. INTERNUS*, but distinct.

This may prove to be the male of *T. reducus*, though it is very different in appearance. *Male.* Cinereous black, with whitish tomentum, which is visible when viewed horizontally; head cinereous; palpi testaceous, very short; antennæ black, reddish at the base, with an extremely small tooth; thorax dull-tawny along each side; abdomen reddish, with a small triangular whitish spot on the hind border of each segment; hind borders of the ventral segments whitish; tibiæ reddish with a black line; wings cinereous, brownish along the costa; veins black, ferruginous at the base; fore branch of the cubital vein simple, nearly straight; halteres whitish. Length of the body 9 lines; of the wings 16 lines.

36. *TABANUS IMMIXTUS*, n. s. *Fam.* Cinereo-niger, capite albido, callo nigro longo angusto sublineari, palpis albidis, antennis nigris basi rufis vix dentatis, abdomine ferrugineo apice nigro maculis trigonis marginibusque posticis testaceis, tibiis fulvis, alis cinereis apud costam subnigris, halteribus testaceis.

Female. Cinereous black; head whitish; callus long, black, slender, nearly linear; palpi whitish; antennæ black, red at the base; tooth extremely small and obtuse; abdomen ferruginous, black towards the tip; each segment with a triangular spot and the hind border testaceous; tibiæ tawny; wings cinereous, slightly lurid along the costa;

veins black, ferruginous at the base; halteres testaceous. Length of the body 6 lines; of the wings 12 lines.

37. *TABANUS FLEXILIS*, n. s. *Fam.* Cinereus, testaceo tomentosus, callo nigro longo gracillimo, palpis testaceis, antennis ochraceis subdentatis apice nigris, abdomine ferrugineo fusco maculis dorsalibus trigonis marginibusque posticis testaceis, tibiis basi fulvis, alis cinereis apud costam subluridis fusco bifasciatis, halteribus testaceis apice albis.

Female. Cinereous, with testaceous tomentum; head with a black, long, extremely slender callus; palpi testaceous; antennæ ochraceous, with black tips and with a very small black tooth; pectus whitish; abdomen ferruginous brown; each segment with a large triangular spot and with the hind border testaceous; tibiæ tawny towards the base; wings cinereous, somewhat lurid along the costa, with two irregular brown bands; 1st band short, discal, 2nd abbreviated hindward; veins black, ferruginous at the base; fore branch of the cubital vein simple, nearly straight; halteres testaceous with white tips. Length of the body 8 lines; of the wings 16 lines.

Gen. *CHRYSOPS*, *Meigen*.

38. *CHRYSOPS FASCIATUS*, *Wied.* See Vol. I. p. 112.

Fam: *ASILIDÆ*, *Leach*.

Subfam. *MYDASITES*, *Walk.*

Gen. *MYDAS*, *Fabr.*

39. *MYDAS BASIFASCIA*, n. s. *Fam.* Atræ, antennis clavatis, abdomine fascia basali flava apice nitente, femoribus tibiisque posticis rufescentibus, alis cinereis apud venas ochraceis.

Female. Deep black; antennæ clavate, a little longer than the breadth of the head; abdomen with a slender yellow band very near the base, shining at the tip; hind femora and hind tibiæ reddish; wings cinereous, ochraceous about the veins, which are also ochraceous. Length of the body 12 lines; of the wings 22 lines.

Subfam. *DASYPOGONITES*, *Walk.*

Gen. *DISCOCEPHALA*, *Macquart*.

40. *DISCOCEPHALA PANDENS*, n. s. *Mas.* Picea, proboscide palpisque nigris, pectore thoracisque lateribus albidis, abdomine subtus pallide cinereo maculis lateralibus nigris, pedibus fulvis, genibus nigris, tarsis piceis, alis fuscescentibus cinereo strigatis et marginatis, halteribus albidis. *Fam.* Abdomine fulvo, alis cinereis.

Male. Piceous; front facets of the eyes large; proboscis and palpi black; mystax with four bristles; pectus and sides of the thorax whitish; abdomen beneath pale-cinereous, with black shining spots along each side; legs tawny; trochanters and knees black; tarsi piceous; wings

brownish, cinereous along the hind border, and with cinereous streaks in the disks of the areolet; halteres whitish. *Female*. Abdomen and halteres tawny; wings cinereous. Length of the body 4-5 lines; of the wings 10-12 lines.

Subfam. LAPHRITES, *Walk.*

Gen. LAPHRIA, *Fabr.*

41. LAPHRIA CONCLUDENS, n. s. *Fam.* Aurata, capite pilis flavis, antennis flavis articulo 3^o rufescente fusiformi, thorace vittis tribus nigris, abdomine fulvo lituris duabus fasciaque interrupta fascisque duabus ventralibus nigris, pedibus fulvis, alis cinereis apud apices nigricantibus, halteribus pallide flavis.
Female. Gilded; head clothed with pale-yellow hairs; mystax with several bristles; proboscis linear, tawny; antennæ yellow; 3rd joint reddish, elongate fusiform; thorax with 3 black stripes, the lateral pair abbreviated; abdomen tawny; 4th and 5th ventral segments with black bands; 4th dorsal segment with a slight black mark on each side; 5th with a widely interrupted black band; legs tawny; wings cinereous, blackish towards the tips; veins black, ferruginous towards the base; halteres pale yellow. Length of the body 11 lines; of the wings 20 lines.
42. LAPHRIA VULCANUS, *Wied.* See Vol. I. p. 10.
43. LAPHRIA TAPHIUS, *Walk. Cat. Dipt.* pt. 2, 380.
Inhabits also the Philippine Islands.
44. LAPHRIA REQUISITA, n. s. *Mas et Fam.* Viridis, capite aurato, antennarum articulo 3^o longi-fusiformi, femoribus posticis incrassatis, alis nigricantibus basi et apud costam cinereis, halteribus testaceis. *Mas.* Femoribus anterioribus incrassatis, halteribus ex parte nigricantibus. *Fam.* Abdomine purpurascenti-cyaneo basi viridi.
Male and Female. Green; head gilded in front, with whitish hairs beneath; mystax with a few black bristles; third joint of the antennæ elongate-fusiform; hind femora incrassated. Wings blackish, cinereous near the base and along nearly half the length of the costa; veins black; halteres testaceous. *Male*. Anterior femora incrassated; halteres partly blackish. *Female*. Abdomen purplish blue, green towards the base. Length of the body 7-9 lines; of the wings 14-16 lines.
45. LAPHRIA PARTITA, n. s. *Mas.* Nigra, capite aurato, antennarum articulo 3^o sublineari, thorace lineis tribus cinereis, lateribus ochraceo-pilosis, maculis duabus humeralibus testaceis, abdomine apice cyanescenti-nigro dimidio basali ochraceo-piloso, pedibus aurato-pilosis, femoribus incrassatis, alis nigricantibus dimidio basali fere sublimpido, halteribus testaceis. *Fam.* Antennarum articulo 3^o longi-fusiformi,

maculis duabus humeralibus albidis, abdomine nigricanti-cupreo, dimidio basali cinereo piloso.

- Male.* Black; head brightly gilded above, clothed with luteous hairs beneath; mystax with some black bristles; 3rd joint of the antennæ nearly linear, conical at the tip, a little longer than the 1st and the 2nd together; thorax with three slender cinereous lines; sides with ochraceous hairs; two humeral testaceous spots; abdomen bluish-black towards the tip; 1st, 2nd, and 3rd segments with ochraceous hairs; legs with gilded hairs and with black bristles; femora incrassated, especially the hind pair; wings blackish, almost limpid for nearly half the length from the base, which is partly blackish; the blackish part emitting some streaks into the limpid part; veins black; halteres testaceous.
- Female.* Third joint of the antennæ elongate fusiform; two humeral whitish spots; 1st, 2nd, and 3rd abdominal segments with cinereous hairs; following segments blackish cupreous. Length of the body 7-9 lines; of the wings 14-16 lines.

46. *LAPHRIA COMPLENS*, n. s. *Fem.* Nigra, capite argenteo, antennarum articulo 3° fusiformi, thorace strigis duabus anticis obliquis maculisque duabus pectoralibus argenteis, abdomine purpureo maculis duabus argenteis, pedibus purpurascanti-nigris, femoribus non incrassatis, alis nigricantibus, halteribus apice testaceis.

Female. Black; head silvery, with black hairs beneath; mystax with several black bristles; third joint of the antennæ fusiform; thorax with an oblique silvery streak on each side in front; pectus with a silvery spot on each side; abdomen purple, with a silvery spot on each side of the 4th segment; legs purplish-black; femora not incrassated; wings blackish; veins black; discal veinlet and third externo-medial vein nearly forming one straight line; halteres with testaceous knobs. Length of the body 7 lines; of the wings 12 lines.

47. *LAPHRIA DIOCTRIOIDES*, n. s. *Fem.* Nigra, tenuis, linearis, facie pectoreque argenteis, antennis linearibus, abdomine maculis lateralibus pedibusque fulvis, femoribus posticis nigro fasciatis, tibiis tarsisque posticis nigris, alis cinereis, halteribus pallide flavis.

Female. Black, slender, linear; face silvery; mystax with four black bristles; antennæ slender, linear, nearly as long as the breadth of the head; pectus silvery; abdomen with tawny dots along each side; legs tawny; a black ring on each hind trochanter; hind femora with a black band; hind tibiæ and hind tarsi black, the latter tawny beneath; wings cinereous; veins black; halteres pale yellow. Length of the body 2½ lines; of the wings 5 lines.

Subfam. ASILITES, *Walk.*

Gen. TRUPANEA, *Macq.*

48. *TRUPANEA STRENUA*, n. s. *Fem.* Nigra, robusta, capite fuscescenti-cinereo, pilis subtus flavescanti-cinereis, abdomine fuscescenti-

nigro fascia basali fasciculari alba apice nigro nitente, pedibus crassis, alis fuscescentibus vitta sordide albida, halteribus fulvis.

Female. Black, stout; head brownish cinereous, very thickly clothed beneath with yellowish cinereous hairs; epistoma very prominent; mystax with a few black bristles above and with many yellowish cinereous bristles below; palpi with short black bristles; 3rd joint of the antennæ elongate conical; thorax with black bristles hindward and along each side; pectus cinereous; abdomen brownish black, with a basal band of white tufts; tip black, shining; legs very stout; pulvilli reddish; wings brownish; radial areolet with a dingy whitish stripe; veins black; halteres tawny. Length of the body 11 lines; of the wings 22 lines.

49. *TRUPANEA CALORIFICA*, n. s. *Mas et Fem.* Ochracea, capite aurato, antennis nigris, thorace vittato, abdomine maculis magnis transversis subquadratis nigris, pedibus rufis crassis, tarsis nigris, alis cinereis vitta sordide albida, halteribus fulvis. *Mas.* Pectore abdomineque cinereis, hujus fasciculo subapicali argenteo. *Fem.* Pectore testaceo, abdomine fulvo.

Male and Female. Ochraceous; head gilded in front, thickly clothed beneath; epistoma prominent; mystax with numerous gilded bristles and above with a few black bristles; palpi with short black bristles; antennæ black; third joint fusiform; thorax with slender indistinct stripes; abdomen with a large black transverse subquadrate spot on each segment; legs red, very stout; tarsi black; wings cinereous; radial areolet with a dingy whitish stripe; veins black; halteres tawny.

Male. Head with whitish hairs beneath; pectus and abdomen cinereous, the latter with a silvery-white subapical tuft. *Female.* Head with gilded hairs beneath; pectus testaceous; abdomen tawny. Length of the body 9-11 lines; of the wings 18-20 lines.

Gen. *ASILUS*, Linn.

50. *ASILUS DETERMINATUS*, n. s. *Mas et Fem.* Cinereo-niger, capite subaurato, antennis nigris, thorace vittis tribus cinereis, pedibus fulvis robustis, femoribus nigro vittatis, tibiis apice tarsisque nigris, alis fuscis, halteribus testaceis. *Mas.* Abdomine pilis basalibus luteis. *Fem.* Abdomine pilis basalibus cinereis dimidio apicali stylato.

Male and Female. Cinereous black; head slightly gilded in front, with pale hairs beneath; epistoma not prominent; mystax with many pale, and above with a few black bristles; antennæ black; third joint lanceolate; arista nearly as long as all the preceding joints; thorax with three cinereous stripes, the lateral pair dilated towards the humerus on each side; pectus cinereous; legs tawny, stout; femora striped above with black; tarsi and tips of the tibiæ black; wings brown; veins black; halteres testaceous. *Male.* Abdomen with luteous hairs towards the base. *Female.* Abdomen with cinereous hairs

towards the base ; nearly half the apical part stylate. Length of the body 10-12 lines ; of the wings 18-20 lines.

51. *ASILUS INTRODUCENS*, n. s. *Fem.* Cinereo-niger, capite aurato, antennis nigris, thorace vittis duabus lateribusque cinereis, abdomine fasciculis quatuor basalibus cinereis dimidio apicali stylato, pedibus nigris robustis rufo variis, alis fuscescentibus, halteribus fulvis. *Mas?* Capite argenteo, abdomine fascia basali fasciculari fasciaque subapicali albidis latis, alis obscure cinereis.

Female. Cinereous black ; head gilded in front, with cinereous hairs beneath ; epistoma slightly prominent ; mystax with several gilded bristles, and above with a few black bristles : antennæ black ; 3rd joint lanceolate, nearly as long as the arista : thorax with two cinereous stripes, which are dilated on each humerus ; sides and pectus cinereous : abdomen with two cinereous tufts on each side at the base ; nearly half the apical part stylate : legs black, stout ; femora red beneath and partly above ; tibiæ with a broad red band : wings brownish, somewhat paler towards the base and about the borders of the posterior areolets ; veins black ; halteres tawny.

Male? Head silvery in front ; mystax with several white, and above with a few black bristles ; abdomen with a broad whitish tufted band at the base, and with a broad whitish subapical band ; wings dark cinereous, partly paler, as in the female. Length of the body 8-12 lines ; of the wings 12-16 lines.

52. *ASILUS AREOLARIS*, n. s. *Mas.* Cinereo-niger, capite aurato, antennis nigris basi fulvis, thorace vittis tribus cinereis, abdomine apice nigro nitente segmentis cinereo marginatis, pedibus fulvis, tarsis posterioribus nigris, alis fuscescenti-cinereis pallido lituratis triente basali albedo, halteribus testaceis. *Fem?* Antennarum articulo 3º fusiformi, alis fuscescentibus hyalino lituratis.

Male. Cinereous black ; head gilded in front, clothed with black hairs beneath ; epistoma prominent ; mystax with many gilded bristles, and above with a few black bristles ; antennæ black, tawny towards the base ; thorax with three slender cinereous stripes, sides and pectus cinereous ; abdomen black and shining at the tip, hind borders of the segments cinereous ; legs tawny ; posterior tarsi black ; wings brownish cinereous, with paler marks in most of the areolets, white on more than one-third of the length from the base ; veins black, tawny towards base ; halteres testaceous.

Female? Epistoma less prominent ; third joint of the antennæ fusiform, hardly half the length of the arista ; wings brownish ; marginal areolets with a nearly colourless spot in each. Length of the body 10 lines ; of the wings 18 lines.

53. *ASILUS TENUICORNIS*, n. s. *Fem.* Cinereus, capite argenteo, antennis testaceis parvis, thorace vittis duabus fuscescentibus, abdomine obscure cinereo segmentis testaceo marginatis, pedibus fulvis,

genubus tarsisque nigris, alis cinereis apice obscurioribus, halteribus testaceis.

Female. Cinereous; head silvery white in front; epistoma very slightly prominent; mystax with some white bristles, and above with very few black bristles: antennæ testaceous; 3rd joint conical, much shorter than the 1st joint, and not more than one-fourth of the length of the arista: thorax with two brownish stripes: abdomen dark cinereous; hind borders of the segments testaceous: legs tawny; tarsi, except at the base and knees, black: wings cinereous, dark cinereous towards the tips; veins black, tawny towards the base; halteres testaceous. Length of the body 8 lines; of the wings 14 lines.

Gen. OMMATIUS, *Illiger*.

54. OMMATIUS SCITULUS, n. s. *Mas et Fœm.* Fulvus, gracilis, capite cinereo antice albo, antennis nigris basi fulvis, thoracis disco cinereo-nigro, pectore testaceo, abdominis segmentis pallido marginatis, alis cinereis, halteribus testaceis.

Male and Female. Tawny, slender; head cinereous above, white in front; mystax with several white bristles; antennæ black, tawny towards the base. 3rd joint lanceolate, arista not longer than the 3rd joint; disk of the thorax cinereous black; pectus testaceous; hind borders of the abdominal segments pale; tarsi black towards the tips; wings cinereous; veins black, tawny towards the base; halteres testaceous. Length of the body 6-7 lines; of the wings 11-12 lines.

55. OMMATIUS STRICTUS, n. s. *Mas.* Niger, angustus, capite argenteo, pectore albedo-cinereo, abdomine fusco maculis trigonis nigris, segmentis albedo marginatis, pedibus fulvis, genibus tarsisque nigris, alis subcinereis extus nigricantibus, halteribus testaceis.

Male. Black, narrow; head silvery white in front; mystax with very few white bristles; third joint of the antennæ elongate-conical; arista a little longer than all the preceding joints together; pectus whitish cinereous; abdomen brown, each segment with a black triangular spot and with a whitish hind border; legs tawny; knees and tarsi black, the latter tawny at the base; wings greyish, exterior half blackish; veins black; halteres testaceous. Length of the body 4-4½ lines; of the wings 7-8 lines.

Gen. LEPTOGASTER, *Meigen*.

56. LEPTOGASTER MUNDA, n. s. *Mas.* Cinerea, capite argenteo, proboscide antennisque fulvis, thorace lineis duabus fuscis, abdomine longo gracili apicem versus subdilato, segmentorum marginibus maculisque quatuor subapicalibus testaceis, pedibus fulvis, femoribus tibiisque posticis nigro fasciatis, alis subcinereis, halteribus testaceis.

Male. Cinereous; head silvery white; proboscis and antennæ tawny; thorax with two brown lines; abdomen long, slender, slightly dilated

towards the tip, hind borders of the segments testaceous, two testaceous spots on each side towards the tip; legs tawny, hind femora and hind tibiae with a black band on each; wings slightly greyish; veins black, tawny at the base; halteres testaceous. Length of the body 6 lines; of the wings 8 lines.

Fam. LEPTIDÆ, *Westw.*

Gen. LEPTIS, *Fabr.*

57. LEPTIS FERRUGINOSA, *Wied.* See Vol. I. p. 118.

Heliomeia ferruginea, *Dolichall.*

Dr. Dolichall has described this species and several other Diptera in a Zoological Journal published in Java. I am unable to refer to this work, but have adopted the names with which he has ticketed the species in Mr. Wallace's collection.

Heliomeia has the aspect of *Leptis*, but is distinguished by the subanal and anal veins being united before they join the border of the wing, thus agreeing with *Chrysopila*, from which it differs in the shorter third joint of the antennæ, and in the more slender arista.

Gen. SURAGINA, n. g.

Fam. Corpus lineare. *Caput* thorace vix angustius. *Proboscis* porrecta, compressa, capitis latitudine paullo brevior. *Palpi* lanceolati, porrecti. *Antennæ* brevissimæ; articularum 3^æ rotundus; arista gracilis, nuda. *Abdomen* subdepressum, thorace non duplo longius, apice obtusum. *Pedes* nudi, inermes, longiusculi, sat graciles. *Alæ* mediocres, areolæ discali longissima.

Female. Body linear, moderately broad. Head almost as broad as the thorax; vertex and front of equal breadth. Proboscis porrect, compressed, a little shorter than the breadth of the head. Palpi lanceolate, contiguous to the proboscis. Antennæ very short; 3rd joint round; arista slender, bare, longer than the antenna. Thorax a little narrower in front. Abdomen somewhat flat, less than twice the length of the thorax, obtuse at the tip. Legs bare, unarmed, rather long and slender. Wings moderately long and broad; radial vein slightly curved; forks of the cubital vein a little longer than the preceding part; 3rd externo-medial vein inclined beyond the discal areolet towards the 4th, which is straight; subanal and anal veins united close to the border; discal areolet nearly six times longer than broad, its fore side hardly angular.

58. SURAGINA ILLUCENS, n. s. *Fam.* Cinereo-nigra, capite argenteo-cinereo supra atro, palpis antennisque nigris, thorace vittis duabus cinereis, abdomine basi cinereo maculis duabus magnis basalibus apiceque testaceis, pedibus nigris, femoribus testaceis nigro cinctis, tibiis intermediis luridis, alis fuscis postice cinereis albo bifasciatis et bistrigatis.

Female. Cinereous black; head silvery grey, deep black above; proboscis, palpi, and antennae black; thorax with two cinereous stripes; pectus cinereous; abdomen cinereous at the base; two large basal and lateral spots and the tip testaceous; legs black, femora testaceous, anterior femora black towards the base, hind femora with a broad black band, middle tibiae lurid; wings brown, cinereous along the basal part of the interior border; two white abbreviated bands and two white intermediate streaks; veins black; halteres testaceous, with black knobs. Length of the body 7 lines; of the wings 12 lines.

Fam. BOMBYLIDÆ, *Leach.*

Subfam. THEREVITES, *Walk.*

Gen. THEREVA, *Latr.*

59. *Thereva congrua*, *Walk.* See Vol. II. p. 90.

Subfam. BOMBYLITES, *Walk.*

Gen. ANTHRAX, *Fabr.*

60. *Anthrax Tantalus*, *Fabr. Ent. Syst.* iv. 260. 15. .

Inhabits also Hindostan, China, and Java.

61. *Anthrax semiscita*, *Walk.* See Vol. I. p. 118.

62. *ANTHRAX PRETENDENS*, n. s. *Fam.* Nigra, fulvo tomentosa, thorace strigis duabus albidis, abdomine fasciis albidis maculisque duabus apicalibus albis, alis subcinereis basi nigris apud costam nigricantibus, halteribus albidis.

Female. Black; head with tawny tomentum in front, cinereous behind and beneath; thorax with tawny hairs in front and on each side, a whitish streak on each side by the base of the wing; abdomen with whitish bands, and with a white spot on each side at the tip, sides with tawny hairs at the base; wings slightly cinereous, black at the base, blackish along nearly half the length of the costa; veins black; radial vein forming a right angle at its base, curved towards its tip; fore branch of the cubital vein deeply curved; externo-medial veins almost straight; subanal and anal veins approximate on the hind border; halteres whitish. Length of the body 6 lines; of the wings 12 lines.

This and the two following species belong to the group of which *A. hottentotta* is the type.

63. *ANTHRAX ANTECEDENS*, n. s. *Fam.* Nigra, flavescente pilosa, capite cinereo, abdomine fasciis late interruptis guttisque duabus apicalibus albis, lateribus anticis albo pilosis, alis hyalinis basi nigricanti-fuscia.

Female. Black; head cinereous in front and beneath; thorax with pale-

yellowish hairs in front and on each side; abdomen with broadly interrupted white bands, a white dot on each side at the tip, sides with white hairs towards the base; wings hyaline, blackish brown at the base; veins black; radial vein curved towards the tip; fore branch of the cubital vein deeply curved; externo-medial veins straight; subanal and anal veins somewhat approximate on the hind border, Length of the body 4 lines; of the wings 8 lines.

64. *ANTHRAX CONGRUA*, n. s. *Mas.* Nigra, albo pilosa, capite abdominisque lateribus nigro pilosis, abdomine fasciis duabus pallidis, alis subcinereis basi et apud costam nigricantibus, litura costali basali argentea.

Male. Black; head and sides of the abdomen clothed with short black hairs; antennæ very short, 3rd joint round; thorax clothed with white hairs in front and along each side; abdomen with two slender pale bands; wings slightly greyish, blackish at the base and along half the length of the costa, which has a silvery mark at its base; veins black; radial vein curved towards its tip; fore branch of the cubital vein deeply curved; externo-medial veins straight; subanal and anal veins somewhat approximate on the hind border. Length of the body 3 lines; of the wings 6 lines.

65. *ANTHRAX DEMONSTRANS*, n. s. *Fem.* Nigra, flavescente pilosa, capite cinereo, abdomine fascia subinterrupta guttisque duabus apicalibus albis, lateribus nigro pilosis basi luteo pilosis, alis nigricantibus basi et apud costam nigris.

Female. Black; head with cinereous tomentum behind and beneath; thorax with yellowish hairs on each side; abdomen with a white middle band, which is almost interrupted in the middle and slightly dilated on each side, a white dot on each side at the tip; sides with black hairs, and at the base with luteous hairs; wings blackish, black at the base and along the costa; radial vein forming a rounded angle at its base, as deeply curved towards its tip as is the fore branch of the cubital vein, to which it is parallel; 1st and 2nd externo-medial veins undulating, 3rd nearly straight; subanal and anal veins approximate on the hind border. Length of the body 5 lines; of the wings 10 lines.

66. *ANTHRAX PRÆDICANS*, n. s. *Fem.*; Nigra, nigro pilosa, antennis brevissimis articulo 3° rotundo, pedibus piceis, alis nigricantibus, albido strigatis, apice et apud marginem posticum cinereis.

Female. Black; head and sides of the thorax and of the abdomen clothed with short black hairs; antennæ very short, 3rd joint round; legs piceous; wings blackish, dark grey at the tips and along the hind border; discal, pabrachial, 3rd externo-medial, and anal areolets with whitish streaks; radial vein undulating towards its tip; fore-branch of the cubital vein slightly curved; externo-medial veins straight; subanal and anal veins approximating closely on the hind

Male. Bright green; head in front and pectus silvery white; antennæ black, testaceous at the base; arista about as long as the thorax; abdomen with a broad black band on the base of each segment; legs yellowish, stout; tarsi black; femora paler than the tibiæ; hind femora with black tips; wings greyish; veins black; cubital vein slightly curved; fore branch of the præbrachial vein much curved; discal transverse vein straight; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

73. *PSILOPUS ABRUPTUS*, n. s. *Mas.* Viridis, capite cyaneo, facie pectoreque subargenteis, antennis pedibus halteribusque nigris, abdomine cyanescente-viridi, alis cinereis.

Male. Bright green; head blue; its fore part and the pectus somewhat silvery; antennæ black; arista hardly longer than the thorax; abdomen bluish green; legs black; wings grey; veins black; fore branch of the cubital vein forming a much rounded right angle, from whence it is straight to its tip; discal transverse vein straight, parted by half its length from the border, and by less than its length from the fork of the cubital; halteres black. Length of the body 2 lines; of the wings 4 lines.

Gen. DOLICHOPUS, Latr.

74. *DOLICHOPUS CINEREUS*, n. s. *Mas.* Cinereus, capite albo, antennis fulvis, pectore albedo, abdomine fasciis æneo-nigris, pedibus testaceis, tarsis anterioribus apice nigricantibus, tibiis posticis apice tarsisque posticis nigris, alis cinereis, halteribus testaceis.

Male. Cinereous, not metallic; head white between the eyes; antennæ tawny; 3rd joint elliptical; arista black, much longer than the antennæ; pectus whitish; abdomen with an æneous black band on each segment; legs testaceous, stout; anterior tarsi blackish towards the tips; hind tarsi and tips of hind tibiæ black; wings grey; veins black; præbrachial vein forming a right angle at its flexure, much curved from thence to the border; discal transverse vein slightly bent outwards; halteres testaceous. Length of the body 3 lines; of the wings 5 lines.

75. *DOLICHOPUS PRÆDICANS*, n. s. *Fem.* Cinereus, capite pectoreque albis, antennis fulvis, thorace vitta apiceque viridibus, abdomine maculis lateralibus albis, pedibus testaceis, femoribus posticis nigro lineatis, alis cinereis basi nigricantibus, halteribus fulvis.

Female. Cinereous; head and pectus white; antennæ tawny; arista black, longer than the antennæ; thorax with a dorsal stripe and the hind part green; abdomen with white spots along each side; legs testaceous, stout; tibiæ beset with black spines; tarsi black towards the tips; hind femora with a black line; wings cinereous, blackish towards the base; veins black; præbrachial vein gently curved outwards at its flexure, straight from thence to the border; discal trans-

verse vein straight; halteres tawny. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

76. *DOLICHOPUS PROVECTUS*, n. s. *Fam.* Viridis, capite pectoreque argenteis, antennis nigris latiusculis basi testaceis, thorace vittis duabus nigris, abdomine fasciis argenteis, pedibus nigris, robustis spinosis, tibiis testaceis, alis obscure cinereis.

Female. Bright green; head in front and pectus silvery white; antennæ black, rather broad, testaceous towards the base; 3rd joint conical; arista much longer than the antennæ; thorax with a black stripe on each side; abdomen with silvery white bands; legs black, stout, spinose; tibiæ testaceous; wings dark grey; veins black; præbrachial vein forming a very obtuse angle at its flexure, straight from thence to the border; discal transverse vein straight. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

77. *DOLICHOPUS PRÆMISSUS*, n. s. *Mas.* Obscure viridis, capite pectoreque cinereis, antennis nigris, abdomine viridescente-nigro, pedibus nigris vix spinosis, tibiis ferrugineis, alis obscure cinereis, halteribus fulvis.

Male. Approaches the *Psilopi* in some of its characters. Dark green; head in front and pectus cinereous; antennæ black, very small and short; 3rd joint conical; arista as long as the breadth of the head; abdomen greenish black; legs black, hardly spinose or setose; tibiæ ferruginous; wings dark grey; veins black; præbrachial vein hardly bent between the straight discal transverse vein and the border; halteres tawny. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

78. *DOLICHOPUS PROVENIENS*, n. s. *Fam.* Obscure viridis, capite albo, antennis nigris, thorace vittis duabus pectoreque cinereis, abdomine cyanescente-viridi fasciis cupreis, pedibus nigris, femoribus anterioribus apice tibiisque fulvis, alis nigricantibus, halteribus fulvis.

Female. Dark green; head white in front and about the eyes; antennæ black; 3rd joint round; arista shorter than the breadth of the head; thorax with two cinereous stripes; pectus cinereous; abdomen bluish green, with cupreous bands; legs black; tibiæ and tips of anterior femora tawny; wings blackish; veins black; præbrachial vein quite straight; discal transverse vein straight, parted by twice its length from the end of the subanal vein; halteres tawny. Length of the body 2 lines; of the wings 4 lines.

Gen. *CHRYBOTUS*, *Meigen*.

79. *CHRYBOTUS EXACTUS*, n. s. *Mas.* Obscure viridis, cinereo-tomentosus, antennis pedibusque nigris, abdomine obscure cupreo, tibiis anticis fulvis, alis cinereis.

Male. Dark green, with cinereous tomentum; antennæ black; 3rd joint conical; arista much shorter than the breadth of the head; abdomen dark-cupreous; legs black; fore tibiæ tawny; wings grey;

veins black; præbrachial vein hardly bent exteriorly; discal transverse vein parted by more than four times its length from the end of the subanal vein. Length of the body $1\frac{1}{2}$ line; of the wings 2 lines.

Gen. DIAPHORUS, *Meigen*.

80. DIAPHORUS RESUMENS, *Wlk.* See Vol. 11. p. 93.

Fam. LONCHOPTERIDÆ, *Curtis*.

Gen. CADREMA, n. g.

Mas. Corpus brevisculum, sat gracile. Caput thorace vix angustius; facies subobliqua. Antennæ brevissimæ; arista apicalis, longa, subpubescens. Abdomen ovatum, thorace vix longius. Pedes posteriores robusti; tibiæ posticæ calcare apicali arcuata. Alæ angustæ, lanceolatæ.

Male. Body rather short and slender; head nearly as broad as the thorax; face slightly oblique. Antennæ extremely short; arista long, apical, minutely pubescent. Abdomen oval, hardly longer or broader than the thorax. Posterior legs stout; hind tibiæ with a curved apical spur. Wings narrow, lanceolate; cubital vein and præbrachial vein parallel, the latter ending at the tip of the wing; discal transverse vein straight, ending at full thrice its length from the border and at nearly thrice its length from the præbrachial transverse.

81. CADREMA LONCHOPTEROIDES, n. s. *Mas.* Testacea, antennis luteis, thoracis disco et metathorace nigris, abdomine apicem versus nigricante, alis vitreis macula apicali nigricante.

Male. Testaceous; antennæ luteous; disk of the thorax and metathorax black; abdomen blackish towards the tip; wings vitreous, with a blackish apical spot; veins black, testaceous towards the base. Length of the body $1\frac{1}{2}$ line; of the wings 4 lines.

Fam. PLATYPEZIDÆ, *Haliday*.

Gen. PLATYPEZA, *Meigen*.

82. PLATYPEZA GLAUCESCENS, n. s. *Mas et Fem.* Piceo-nigra, capite gutta atra, thoracis disco cyanescente-cinereo, abdomine nigro, pedibus halteribusque piceis, tarsis albidis, posticis dilatatis, alis vitreis.

Male and Female. Piceous black; head with a deep black dot in front; disk of the thorax with a bluish-cinereous tinge; abdomen black; legs piceous; tarsi whitish; hind tarsi dilated; wings quite vitreous; veins black; discal transverse vein parted by nearly twice its length from the border, and by more than twice its length from the fork of the præbrachial vein; fore branch of the latter joining the termination of the costal vein at the tip of the wing, close to the end of the cubital vein; halteres piceous. Length of the body $1-1\frac{1}{2}$ line; of the wings $2-2\frac{1}{2}$ lines.

Fam. SIPPHIDÆ, *Leach.*Gen. CERIA, *Fabr.*

83. CERIA LATERALIS, n. s. *Mas.* Nigra, capite vittis guttisque duabus, thorace maculis octo, pectore fasciis duabus, abdomine maculis duabus basalibus fasciisque duabus flavis, antennarum petiolo pedibusque rufis, alis subcinereis, basi costa strigaeque fuscis, halteribus flavis.

Male. Black; head with two yellow stripes in front, and with a yellow dot on each side at the base of the antennæ; petiole of the latter reddish; 3rd joint elongate-fusiform: thorax with three yellow calli on each side; scutellum with two oblique fusiform yellow spots which are united hindward; pectus with a yellow band on each side; abdomen with a slender petiole which is as long as the terminal fusiform part; a yellow spot on each side of the base; hind borders of the 1st and 2nd segments yellow; legs red; tarsi piceous; wings greyish, dark brown at the base, whence a dark brown streak proceeds to the disk; costa dark brown, blackish exteriorly; veins black; halteres yellow. Length of the body 12 lines; of the wings 16 lines.

Gen. MILEZIA, *Latr.*

84. MILEZIA CONSPICIENDA, n. s. *Mas et Fem.* Nigra, capite flavo maculis duabus nigris, palpis antennisque rufescentibus, thorace vittis fasciis maculisque duabus, scutelli margine abdomineque fasciis tribus flavis, abdomine fasciis tribus chalybeis, pedibus luteis, femoribus nigro vittatis, tarsis nigris apice luteis, alis cinereis apud costam fuscis.

Male and Female. Black; head yellow, with an elongate black spot above the antennæ, and with another above the epistoma; mouth black; palpi and antennæ reddish; thorax with two yellow stripes; each of its sides in front with a large yellow spot, the latter connected with a band across the pectus; two yellow bands, the 1st interrupted; scutellum bordered with yellow; pectus with two yellow bands on each side; abdomen with three yellow bands and with three chalybeous bands; 3rd yellow band slightly interrupted; legs luteous; femora striped beneath with black; tarsi black, with luteous tips; wings grey, brown along the costa; veins black; halteres yellow. *Male.* Abdomen with a subapical interrupted band; 1st band notched on the hind side. *Female.* First abdominal band slightly interrupted. Length of the body 8-9 lines; of the wings 14-16 lines.

Gen. GRAPTOMYZA, *Wied.*

85. GRAPTOMYZA TIBIALIS, *Wlk.* See Vol. II. p. 95.

Fem.? Lutea, crassa, lata, pubescens, vertice et epistomatis linea nigris, thoracis maculis duabus, disco postico, scutelli pectorisque discis cinereo-nigris, abdomine fasciis tribus nigris, femoribus anterioribus tibiisque nigro fasciatis.

Female? Luteous, pubescent, broad, thick; vertex black; epistoma

conical, forked at the tip, with a black line; proboscis longer than the thorax, black towards the base; arista plumose; two large spots on the thorax, its disk hindward, disk of the scutellum and disk of the pectus cupreous black; abdomen highly arched, with three black bands which are produced and slightly interrupted in the middle; apical band very broad; tibiae and anterior femora with black bands; wings with a luteous stigma. Length of the body 5 lines; of the wings 8 lines.

Gen. *ERISTALIS*, *Latr.*

86. *Eristalis crassus*, *Fabr. Ent. Syst. IV.* 281, 12.

Inhabits also Hindostan.

87. *Eristalis Aesopus*, *Wlk. Cat. Dipt. pt. 3*, 625.

Inhabits also China.

88. *ERISTALIS BOMBROIDES*, n. s. *Mas.* Ater, capite albo, arista nuda, thorace pubescente fascia cinerea fasciaque chalybeo-nigra, pectore cinereo, abdomine fasciis quatuor chalybeo-nigris, vittis duabus ventralibus latis albidis, tibiis basi flavis, alis nigricante-fuscis cinereo marginatis, halteribus flavis.

Male. Deep black; head with black hairs on the front and with white tomentum in front and behind; arista simple; thorax thickly pubescent, having in front a cinereous band which is tawny on each side, and a chalybeous black hinder band; scutellum chalybeous-black; pectus cinereous; abdomen with four chalybeous-black bands; the 1st widely interrupted; under side with a broad short whitish stripe on each side; hind (and anterior?) tibiae yellow at the base; wings blackish-brown, cinereous towards the tips and along the hind border; veins black; halteres yellow. Length of the body $5\frac{1}{2}$ lines; of the wings 11 lines.

Gen. *HELOPHILUS*, *Meigen.*

The two following *Helophili* may be merely varieties of *H. quadrivittatus*.

89. *HELOPHILUS CONSORS*, n. s. *Mas.* Niger, thorace vittis quatuor flavis, scutello luteo, abdomine vittis tribus luteis tribusque chalybeis, tibiis basi luteis, femoribus posticis incrassatis, alis cinereis apud costam fuscescentibus, halteribus flavis.

Male. Black; thorax with four yellow stripes; scutellum luteous; pectus cinereous; abdomen with three luteous bands and with four chalybeous bands; 1st luteous band interrupted, very broad; 3rd and 4th slightly excavated on the hind side; tibiae luteous towards the base; hind femora incrassated; hind tibiae curved; wings cinereous, brownish along the costa; veins black; halteres yellow. Length of the body 5 lines; of the wings 9 lines.

90. *HELOPHILUS CONCLUSUS*, n. s. *Mas.* Niger, capite albo, antennis

rufescentibus, arista nuda, thorace vittis quatuor flavis, scutello fulvo, abdomine fasciis quatuor lineaque transversa flavis fasciaque chalybea, pedibus nigro-luteis, tarsis nigris, alis cinereis apud costam subfuscis, halteribus flavis.

Male. Black; head white, with a black callus above the antennæ, which are reddish; arista simple; proboscis black; thorax with 4 yellow stripes; scutellum tawny; pectus with a broad oblique pale yellow band on each side; abdomen with 4 yellow bands; 1st and 2nd bands very broad; 1st interrupted; 2nd interrupted except in front, where there is a yellow transverse line; 3rd and 4th narrow, with a chalybeous band along the hind border of the 3rd; legs luteous, shaded with black; tarsi wholly black; wings grey, slightly brown along the costa; veins black, tawny towards the base; halteres yellow. Length of the body 5 lines; of the wings 9 lines.

Gen. MERODON, *Fabr.*

91. *MERODON INTERVENIENS*, n. s. *Mas.* Fuscus, flavescens-cinereo tomentosus, capite testaceo, antennis nigris, arista nuda, scutello fulvo, abdomine fasciis septem ventreque testaceis, pedibus fulvis, femoribus nigro vittatis, femoribus posticis incrassatis, tibiis posticis nigris, alis cinereis litura costali nigricante, halteribus flavis.

Male. Brown; head with short black hairs on the vertex, white behind, pale testaceous, and with a brown stripe in front; proboscis and antennæ black; arista simple; thorax thickly clothed with yellowish cinereous down; scutellum tawny; pectus cinereous; abdomen cylindrical-conical, with seven testaceous bands; under side testaceous; legs tawny; femora striped with black; hind femora incrassated; hind tibiæ curved, black; wings cinereous, with a blackish mark by the middle of the costa; veins black, halteres yellow. Length of the body 6 lines; of the wings 10 lines.

Gen. VOLUCELLA, *Geoff.*

92. *VOLUCELLA DECORATA*, n. s. *Mas.* Fulva, oculis thoraceque pubescentibus, hujus disco cupreo-nigro, abdomine cupreo-nigro fasciis tribus flavis, pedibus piceo-fulvis, tarsis piceis basi fulvis, alis vitreis, costa lutea extus fuscescente, halteribus apice niveis.

Male. Tawny; epistoma very prominent; eyes pubescent; arista broadly plumose; thorax pubescent; disk cupreous-black; abdomen cupreous-black, with three yellow bands; 1st band basal; legs slightly shaded with piceous; tarsi piceous, tawny at the base; wings vitreous, luteous and exteriorly brownish along the costa; veins tawny, black towards the tips; halteres with snow-white knobs. Length of the body 7 lines; of the wings 14 lines.

Gen. BARYTEROCERA, *Walk.* See Vol. I. p. 123.

93. *BARYTEROCERA GIBBULA*, n. s. *Flem.* Cupreo-nigra, capite fla-

vescente vitta cupreo-nigra, antennis fulvis, thoracis lateribus fasciaque flavis, abdominis lateribus fasciis tribus flavis strigisque tribus flavis, pedibus flavis, tibiis posticis femoribusque nigris apice flavis, alis cinereis, litura costali fasciisque duabus exterioribus nigricantibus.

Female. Cupreous black; head in front yellowish with a cupreous-black stripe; antennæ tawny; 3rd joint long, linear, obtuse at the tip; thorax yellow along each side and with a yellow band in front of the scutellum; abdomen yellow along each side and with three yellow bands; 1st band entire; 2nd nearly interrupted; 3rd emitting a lanceolate streak in front and two hindward streaks which extend to the tip; legs yellow; femora and hind tibiæ black with yellow tips; wings cinereous, with a blackish mark by the middle of the costa, and with two exterior slender blackish bands; veins black; halteres yellow. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. EUMERUS, *Meigen*.

94. EUMERUS FIGURANS, n. s. *Fem.* Niger, capite albo vitta cyanea, scutelli margine postico fulvo, abdomine nigro-æneo fasciis duabus albis, 2^a interrupta, tarsis subtus genubusque testaceis, alis subcinereis.

Female. Black, nearly cylindrical; head whitish, with a dark blue stripe on the vertex; antennæ with whitish tomentum; 3rd joint somewhat dilated, rather broader than long; scutellum tawny along the hind border; pectus cinereous; abdomen æneous-black, minutely punctured, with two white bands, placed oblique with regard to the segments, the 2nd interrupted; tarsi beneath and knees testaceous; wings greyish; veins black; cubital vein much contorted; halteres testaceous. Length of the body $5\frac{1}{2}$ lines; of the wings 6 lines.

Gen. SYRITTA, *St. Farg.*

95. SYRITTA ILLUCIDA, n. s. *Fem.* Ænea, capite argenteo, vertice nigro punctis duobus nigris, antennis pallide rufis, abdomine fasciis duabus latis interruptis testaceis maculisque duabus subapicalibus albis, pedibus testaceis, femoribus tibiisque posticis nigris, his rufo fasciatis, alis subcinereis.

Female. Æneous; head silvery white; vertex black, with an elongated white point on each side; antennæ pale red; pectus and sides of the thorax whitish; abdomen with two broad interrupted testaceous bands; apical segment with a white spot on each side at the base; under side testaceous except near the tip; legs testaceous; hind femora and hind tibiæ black, the latter with a red band; wings greyish-vitreous; veins black. Length of the body $3\frac{1}{2}$ lines; of the wings 5 lines.

Gen. BACCHA, *Fabr.*

96. BACCHA DISPAR, n. s. *Mas.* Cupreo-nigra, capite chalybeo-nigro vittis duabus flavis, antennis rufis, thorace maculis quatuor luteis, ab-

domine fasciis duabus arcuatis luteis, pedibus rufescentibus, alis subcinereis, costa fasciaque nigricante fuscis, halteribus fulvis. *Fem.* Scutello flavo apud discum nigricante, abdominis petiolo fulvo, fascia 2^a non arcuata, apice chalybeo, pedibus testaceis, posticis nigro fasciatis.

Male. Cupreous black; head chalybeous black, with a yellow stripe on each side in front; antennæ red, very short; 3rd joint conical; arista black, short; thorax with two luteous spots on each side; the 1st pair joining a luteous band on each side of the pectus; abdomen petiolated, clavate, with two much-arched luteous bands; legs reddish; wings slightly cinereous, blackish-brown along the costa, and with an irregular blackish-brown band, which hardly extends to the hind border; veins black; halteres tawny.

Female. Scutellum yellow, with a blackish disk; abdomen much compressed, with a long slender linear tawny petiole; the 2nd yellow band not arched; tip chalybeous; legs testaceous; hind femora slightly banded with black; hind tibiæ black towards the tips. Length of the body 4½–5 lines; of the wings 8–9 lines.

Gen. SYRPHUS, *Fabr.*

97. *Syrphus consequens*, *Wlk.* See Vol. I. p. 18.

Fam. MUSCIDÆ, *Latr.*

Subfam. TACHINIDÆ, *Walk.*

Gen. NEMOREA, *Macq.*

98. *NEMOREA AMPLIFICANS*, n. s. *Fem.* Cinereo-nigra, capite testaceo, frontalibus nigris, palpis fulvis, antennis piceis, thorace vittis quinque nigris, scutello ferrugineo, abdomine piceo fasciis duabus latis interruptis cinereis, alis cinereis basi et apud costam fuscis.

Female. Cinereous black, with black bristles; head testaceous, more cinereous beneath; frontalia black, slightly widening to the face, with a row of bristles along each side; facialia not bristly; epistoma not prominent; palpi tawny; antennæ piceous, not extending to the epistoma; 3rd joint linear, rounded at the tip, full twice the length of the 2nd; arista nearly twice the length of the 3rd, stout for full half its length; thorax with five slender black stripes, thickly beset with long stout bristles; scutellum ferruginous except towards its base; abdomen piceous, setose towards its tip; 2nd and 3rd segments with broad interrupted cinereous bands along their fore borders; legs stout, bristly; wings grey, brown at the base and in front; veins black; præbrachial vein forming a slightly obtuse angle at its flexure, from whence it is very slightly curved inward to its tip; discal transverse vein straight, excepting a very slight inward bend near its base, parted by rather more than half its length from the border, and from the flexure of the præbrachial; alula cinereous-white. Length of the body 8 lines; of the wings 14 lines.

99. *NEMORÆA TENEBROSA*, n. s. *Fam.* Cinereo-nigra, capite albedo, frontalibus nigris, oculis pubescentibus, palpis et antennarum articulo 2^o rufescentibus, thorace lineis quinque nigris, scutello rufo, abdomine obscure rufescente tessellis cinereis, femoribus posticis fimbriatis, alis cinereis, basi costa et venarum marginibus obscure fuscis.

Female. Cinereous black, with black bristles; head whitish; frontalia black, slightly widening to the face, with a row of bristles along each side and beyond it; facialia bristly along most of the length; epistoma not prominent; eyes pubescent; palpi reddish; antennæ not nearly reaching the epistoma; 3rd joint linear, slender, obtuse at the tip, much less than twice the length of the 2nd, which is reddish; arista stout for full half its length, much longer than the 3rd joint; thorax with five black lines; scutellum red, black at the base; abdomen dark reddish, slightly tessellated with cinereous; legs black, bristly; hind femora fringed with short black hairs; wings grey, dark brown at the base, along the costa and along the black veins; præbrachial vein forming a right angle at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein much curved inward near its base, parted by much less than its length from the border and by rather less than its length from the flexure of the præbrachial; alulae lurid-cinereous. Length of the body 6 lines; of the wings 12 lines.

Gen. *MASICERA*, *Mag.*

100. *MASICERA DOTATA*, n. s. *Fam.* Cinerea, capite albo, frontalibus atris, oculis nudis, proboscide palpisque fulvis, thorace vittis quatuor nigris, abdomine longi-elliptico fasciis cinereis, alis luridis angustis, dimidio apicali obscure fusco, margine postico cinereo, halteribus testaceis.

Female. Cinereous, beset with numerous long stout black bristles; head white, clothed behind and beneath with white hairs; frontalia deep black, slightly widening towards the face, with stout bristles along each side; facialia without bristles except by the epistoma, which is not prominent; eyes bare; proboscis and palpi tawny; antennæ nearly reaching the epistoma; 3rd joint slightly broader towards the tip, which is rounded, about four times the length of the 2nd; arista stout at the base, very much longer than the 3rd joint; thorax with four black stripes; abdomen elongate-elliptical, its bristles stouter than those of the thorax; a cinereous band along the fore-border of each segment; lips black, stout, bristly; wings lurid, narrow, dark brown on the exterior half, cinereous along the hind border; veins tawny, black exteriorly; præbrachial vein extending rather beyond the slightly acute angle which it forms at its flexure, much curved inward from thence to its tip; discal transverse vein undulating, parted by rather less than its length from the border and from the flexure of the præbrachial; alulae cinereous; halteres testaceous. Length of the body 6 lines; of the wings 12 lines.

101. *MASICERA HORRENS*, n. s. *Fem.* Albido-cinerea, valde setosa, capite albo, facie obliqua, oculis pubescentibus, thorace vittis quatuor nigris, abdomine subfusiformi spinoso fasciis tribus latis subinterruptis albidis, alis cinereis basi et apud costam subfuscis, alulis albido-cinereis.

Female. Whitish cinereous, thickly beset with long stout black bristles; head white, clothed behind and beneath with white hairs; frontalia deep black, hardly widening towards the face, with bristles along each side and beyond it; face oblique; facialia with bristles along nearly two-thirds of the length; epistoma not prominent; eyes pubescent; palpi black, rather long; antennæ nearly reaching the epistoma; 3rd joint linear, rounded at the tip, full four times the length of the 2nd; arista very much longer than the 3rd joint, stout for more than one-third of its length; thorax with four black stripes; abdomen nearly fusiform, more spinose than bristly, with three broad slightly interrupted whitish bands on the fore borders of the segments; legs black, stout, bristly; wings grey, slightly brown at the base and along the costa; veins black; præbrachial vein forming a somewhat rounded right angle at its flexure, near which it is much curved inward and is thence straight to its tip; discal transverse vein undulating, parted by about its length from the border and by much less than its length from the flexure of the præbrachial; alulæ whitish cinereous. Length of the body 7 lines; of the wings 12 lines.

102. *MASICERA IMMERSA*, n. s. *Fem.* Albido-cinerea, capite argenteo, oculis nudis, palpis, antennis pedibusque nigris, thorace lineis quatuor nigris, abdomine nigro fasciis tribus latis interruptis cinereis, alis cinereis, alulis albido-cinereis albo marginatis.

Female. Whitish cinereous, with a few black bristles; head silvery white, with white hairs behind and beneath; frontalia black, widening towards the face, with a row of bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; palpi black; antennæ not reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista slender, very much longer than the 3rd joint; thorax with four slender black lines; abdomen black, conical, not longer than the thorax, with three broad interrupted cinereous bands along the fore borders of the segments; legs black, stout; wings grey; veins black; præbrachial vein forming a slightly rounded and obtuse angle at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein slightly undulating, parted by much less than its length from the border and from the flexure of the præbrachial; alulæ whitish cinereous with white borders. Length of the body 4 lines; of the wings 7 lines.

103. *MASICERA PROGNOSTICANS*, n. s. *Fem.* Cinerea, gracilis, capite albo, abdomine nigro cylindrico fasciis albis, alis cinereis, alulis halteribusque albis.

Female. Cinereous, slender; head white; frontalia deep black, linear, with stout bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; palpi short, slender; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, about six times the length of the 2nd; arista rather slender, not much longer than the 3rd joint; abdomen black, cylindrical, very much longer than the thorax, with a white band on the fore border of each segment; wings cinereous; veins black; præbrachial vein forming a slightly rounded and extremely obtuse angle at the flexure, straight from thence to the tip; discal transverse vein straight, parted by about its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ and halteres white. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

Gen. EURYGASTER, *Macq.*

104. EURYGASTER RIDIBUNDA, n. s. *Fœm.* Cinerea, capite argenteo, oculis pubescentibus, palpis fulvis clavatis, antennis piceis, thorace lineis quatuor nigris, abdomine nigro fasciis tribus latis albido-cinereis, pedibus nigris, alis subcinereis basi et apud costam subluridis, halteribus fulvis.

Female. Cinereous, with black bristles; head silvery white in front and behind, clothed behind and beneath with white hairs; frontalia deep black, hardly widening towards the epistoma, with a few black bristles along each side and beyond; facialia without bristles; epistoma not prominent; eyes pubescent; palpi tawny, clavate; antennæ piceous, almost reaching the epistoma; 3rd joint linear, slightly rounded at the tip, nearly thrice the length of the 2nd; arista slender, very much longer than the 3rd joint; thorax with four black lines; abdomen black, conical, a little broader and longer than the thorax, with three broad whitish-cinereous bands, somewhat spinose towards the tip; legs black, hardly bristly; wings greyish, with a lurid tinge at the base and along part of the costa; veins black, tawny towards the base; præbrachial vein forming a rounded and obtuse angle at its flexure, nearly straight from thence to its tip; discal transverse vein hardly undulating, parted by little more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ cinereous; halteres tawny. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

105. EURYGASTER REMITTENS, n. s. *Fœm.* Cinerea, capite albo, oculis pubescentibus, palpis, antennis pedibusque nigris, thorace lineis quatuor nigris, scutello rufo, abdomine nigro fasciis cinereis fere interruptis, segmenti 2ⁱ lateribus rufescentibus, alis cinereis basi fuscescentibus, alulis albidis.

Female. Cinereous, slightly bristly; head white, clothed behind and beneath with white hairs; frontalia deep black, widening towards the face, with a row of bristles along each side and beyond; facialia without

bristles; epistoma not prominent; eyes pubescent; palpi black, short; antennæ almost reaching the epistoma; 3rd joint slightly widening towards the tip, which is rounded; arista slender, very much longer than the 3rd joint; thorax with four black lines; scutellum red, black at the base; abdomen black, conical, somewhat pilose at the tip, hardly broader or longer than the thorax, with cinereous nearly interrupted bands; 2nd segment reddish on each side; legs black, slightly bristly; wings grey, brownish at the base; veins black; præbrachial vein forming a slightly obtuse angle at its flexure, from whence it is hardly curved inward to its tip; discal transverse vein very slightly undulating, parted by a little more than half its length from the border, and by about half its length from the flexure of the præbrachial; alulæ whitish. Length of the body 5 lines; of the wings 8 lines.

106. *EURYGASTER APTA*, n. s. *Fem.* Cinerea, capite albo, oculis nudis, palpis, antennis, pedibusque nigris, thorace vittis quatuor indistinctis, abdominis vitta dorsali et segmentorum marginibus posticis nigris, alis cinereis apud costam fusciscentibus, alulis albido-cinereis.

Female. Cinereous, with few bristles; head white; frontalia black, narrow, linear, with a row of bristles along each side and beyond; facialia without bristles; epistoma not prominent; eyes bare; palpi black; antennæ almost reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista slender, very much longer than the 4th joint; thorax with four indistinct black stripes; abdomen conical, especially setose towards the tip, very little longer than the thorax; 1st segment, hind borders of the other segments and dorsal stripe black; legs black; wings grey, brownish along the costa; veins black; præbrachial vein forming an obtuse angle at its flexure, hardly curved inward from thence to its tip; discal transverse vein slightly undulating, parted by much less than its length from the border, and by a little less than its length from the flexure of the præbrachial; alulæ whitish cinereous. Length of the body 4 lines; of the wings 7 lines.

107. *EURYGASTER CONGLOMERATA*, n. s. *Fem.* Cinereo-nigra, capite albo, oculis pubescentibus, palpis, antennis pedibusque nigris, thorace lineis quatuor anticis nigris, thorace postico abdomineque anthracinis, tibiis posticis subfimbriatis, alis cinereis, alulis testaceo-albis.

Female. Cinereous black; head white, with white hairs behind and beneath; frontalia deep black, linear, with a row of bristles along each side and beyond; facialia without bristles; epistoma not prominent; eyes pubescent; palpi black; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, six times the length of the 2nd; arista much longer than the 3rd joint, stout to half its length; thorax with four black lines; hind part and abdomen coal black, shining, the latter conical, not longer than the thorax, setose towards the tip; legs black;

hind tibiae slightly fringed; wings grey; veins black; præbrachial vein forming a hardly obtuse angle at its flexure, almost straight from thence to its tip; discal transverse vein undulating, parted by much less than its length from the border, and by a little less than its length from the flexure of the præbrachial; alulae testaceous white, very large. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

108. *EURYGASTER PROMINENS*, n. s. *Mas.* Cinereo-nigra, capite albo, oculis pubescentibus, palpis, antennis pedibusque nigris, thorace lineis quatuor indistinctis, abdominis basi vitta dorsali et segmentorum marginibus posticis nigris, scutelli apice rufescente, abdomine segmenti 2ⁱ lateribus subrufescentibus, alis cinereis, alulis albis.

Male. Cinereous black; head white, with white hairs behind and beneath; frontalia deep black, widening to the epistoma, with a row of bristles along each side and beyond; facialia without bristles; epistoma not prominent; eyes pubescent; palpi black; antennae extending to the epistoma; 3rd joint linear, narrow, rounded at the tip, full four times the length of the 2nd; arista much longer than the 3rd joint, stout to nearly half its length; thorax with four indistinct black lines; scutellum reddish towards its tip; abdomen nearly oval, cinereous, not longer than the thorax; 1st segment, hind borders of the following segments, and dorsal stripe black; 2nd segment slightly reddish on each side; legs black; wings grey; veins black; præbrachial vein forming a right angle at its flexure, near which it is very slightly curved inward, and is thence straight to its tip; discal transverse vein hardly undulating, parted by much less than its length from the border, and by less than its length from the flexure of the præbrachial; alulae white, very large. Length of the body $3\frac{1}{4}$ lines; of the wings $6\frac{1}{2}$ lines.

109. *EURYGASTER DEDUCENS*, n. s. *Fem.* Cinerea, capite albo, oculis nudis, palpis, antennis pedibusque nigris, thorace lineis quatuor, abdominis basi fascisque tribus nigris, scutello rufescente, alis cinereis basi nigris, alulis albis.

Female. Cinereous, bristly, head white, with whitish hairs behind and beneath; frontalia deep black, widening to the face, with black bristles along each side and beyond; facialia without bristles, except by the epistoma, which is slightly prominent; eyes bare; antennae reaching the epistoma; 3rd joint linear, rather broad, slightly rounded at the tip, about four times the length of the 2nd; arista much longer than the 3rd joint, stout to half its length; thorax with four black lines; scutellum reddish; abdomen conical, not longer than the thorax, black at the base, and with three black bands on the hind borders of the segments; wings grey, black at the base; veins black, testaceous at the base, except along the costa; præbrachial vein forming an obtuse angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein straight, except a slight curve at its base, p

by a little more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ white. Length of the body $3\frac{1}{4}$ lines; of the wings 7 lines.

110. *EURYGASTER CONTRACTA*, n. s. *Fam.* Cinerea, brevis, capite albo, palpis, antennis pedibusque nigris, thorace vittis quatuor nigris, abdomine nigro fasciis tribus latis subinterruptis argenteo-cinereis, alis cinereis basi nigricantibus, alulis albis.

Female. Cinereous, short; head white; frontalia deep black, widening slightly towards the face, with stout bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; palpi and legs black; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the second; arista stout for almost one-third of the length; thorax with four black stripes; abdomen black, nearly oval, not longer than the thorax, with three broad slightly interrupted silvery cinereous bands; wings cinereous, blackish at the base; veins black; præbrachial vein forming an obtuse angle at its flexure, nearly straight from thence to its tip; discal transverse vein curved inward towards its base, parted by less than its length from the border, and by about its length from the flexure of the præbrachial; alulæ white. Length of the body $2\frac{1}{4}$ lines; of the wings $4\frac{1}{2}$ lines.

111. *EURYGASTER PROGRESSA*, n. s. *Fam.* Fulva, capite subtus et apud oculos albedo, antennis pallide luteis apice fusciscentibus, abdomine maculis tribus dorsalibus nigris, alis cinereis apud costam luridis apice fuscis, halteribus testaceis.

Female. Tawny, with black bristles; head testaceous, whitish about the eyes and beneath; frontalia pale luteous, widening to the epistoma, beset with bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; antennæ pale luteous, almost reaching the epistoma; 3rd joint linear, brownish towards the tip; arista stout to about one-third of the length; abdomen nearly oval, hardly longer or broader than the thorax, with three black dorsal spots; tarsi piceous; wings grey, lurid along the costa, brown towards the tips, except along the hind border; præbrachial vein forming a slightly obtuse angle at its flexure, much curved inward from thence to its tip; discal transverse vein undulating, parted by much less than its length from the border, and by about its length from the flexure of the præbrachial; alulæ and halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

Gen. *METOPTIA*, *Meigen*.

112. *METOPTIA INSPECTANS*, n. s. *Fam.* Cinerea, capite magno argenteo subconico, facie perobliqua, thorace vittis quatuor, abdominis vitta dorsali et segmentorum marginibus posticis nigris; alis cinereis, alulis albis, halteribus piceis.

Female. Cinereous; head large, silvery, almost conical in front; frontalia black, linear, with a few bristles along each side; face very oblique; facialia without bristles; epistoma not prominent; eyes bare; proboscis and palpi black, very short; antennæ extending to the epistoma, 3rd joint linear, rounded at the tip, full six times the length of the 2nd; arista longer than the 3rd joint; stout to nearly half its length; thorax with four black stripes, the outer pair interrupted; abdomen conical, not longer than the thorax, hind borders of the segments and dorsal stripe black; legs black, rather short and stout; wings grey; veins black; præbrachial vein forming an almost right angle and emitting a branch at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein straight, parted by much less than its length from the border and by very much less than its length from the flexure of the præbrachial; alulæ white; halteres piceous. Length of the body 3 lines; of the wings 5 lines.

113. *METOPIA INSTRUENS*, n. s. *Fam.* Cinerea, capite subconico argenteo micante, facie perobliqua, palpis antennis pedibusque nigris, thorace vittis quatuor nigris, abdomine e maculis nigris trivittato, alis cinereis.

Female. Cinereous; head brilliant silvery, almost conical; face very oblique; facialia with bristles along each side; epistoma not prominent; eyes bare; palpi and legs black; antennæ reaching the epistoma, 3rd joint linear, rounded at the tip, about six times the length of the 2nd; arista longer than the 3rd, stout to about one-third of its length; thorax with four black stripes; abdomen with three rows of triangular black spots; wings cinereous; veins black; præbrachial vein forming an obtuse angle, and emitting a branch at its flexure, slightly curved inward from thence to its tip; discal transverse vein straight, parted by more than its length from the border and from the flexure of the præbrachial; alulæ white. Length of the body 3 lines; of the wings 5 lines.

Subfam. DEXIDES, *Walk.*

Gen. DEXIA, *Meigen.*

114. *DEXIA BASIFERA*, n. s. *Fam.* Testaceo-alba, capitis antici lateribus palpisque fulvis, oculis nudis, antennis pallide luteis, thorace vittis quatuor nigris, abdomine fulvo fusiformi maculis trigonis nigris, macula fasciaque testaceis, pedibus nigris longis, femoribus fulvis apice nigris, tibiis ex parte fulvescentibus, alis cinereis apud venas nigricantibus, fascia basali obliqua alba, alulis albis.

Group of *D. longipes*.

Female. Testaceous white, narrow, bristly; head somewhat prominent; frontalia black, slightly widening towards the epistoma, with a few long stout black bristles on each side; facialia without bristles; epistoma not prominent; sides of the peristoma tawny and slightly pro-

duced; eyes bare; proboscis and palpi tawny, the former geniculated, rather long; antennæ pale luteous, 3rd joint lanceolate, not reaching the epistoma, thrice the length of the second; arista plumose: thorax with two slender deep black stripes and with two exterior broad blackish stripes; scutellum with six black spines: abdomen tawny, fusiform, longer than the thorax, with little black hairs, with several black spines, and with a triangular black spot on the hind border of each segment; 3rd segment with a testaceous spot at the base, 4th with a testaceous basal band: legs long, black; femora tawny, with black tips; tibiae partly dark tawny: wings cinereous, blackish along the veins, with an oblique white basal band; costa black at the base; veins black, testaceous in the white part; præbrachial vein forming a slightly acute angle and emitting a short stump at its flexure, curved inward from thence to its tip; discal transverse vein undulating, parted by hardly more than half its length from the border, and by less than its length from the flexure of the præbrachial; alulae white. Length of the body 5 lines; of the wings 10 lines.

Mas. Subaurato-cinerea, abdomine testaceo lanceolato longissimo fasciis maculisque trigonis nigris connexis, pedibus anticis longissimis, alis apud costam nigricantibus, venis vix nigricante marginatis.

Male. Pale gilded cinereous, narrow, bristly; frontalia piceous, widening much towards the epistoma, with bristles along each side; sides of the peristoma much produced; thorax with four deep black stripes, the outer pair rather broad; abdomen testaceous, lanceolate, twice the length of the thorax; hind border of each segment with a black band which is connected with a triangular black spot; legs very long, fore legs extremely long; wings blackish along the costa, hardly blackish along the veins; præbrachial vein curved slightly inward near its flexure, almost straight from thence to its tip. Length of the body 8 lines; of the wings 12 lines.

115. *DEXIA INCLUDENS*, n. s. *Fæm.* Atra, capite apud oculos albo, palpis antennis pedibusque nigris, thorace vittis duabus cinereis, abdomine lanceolato fasciis tribus albis late interruptis, pedibus longiusculis, alis nigricanti-cinereis, halteribus testaceis.

Female. Deep black; head cinereous in front, white about the eyes; vertex narrow; frontalia widening to the face, with bristles along each side; facialia without bristles; epistoma not prominent; palpi slender; antennæ reaching the epistoma, 3rd joint narrow, linear, about four times the length of the 2nd; thorax cinereous on each side, and with two cinereous stripes; abdomen lanceolate, setose, nearly twice the length of the thorax, with three widely interrupted white bands; legs rather long; wings blackish grey; veins black; præbrachial vein forming a very obtuse and slightly rounded angle at its flexure, almost straight from thence to its tip; discal transverse vein almost straight, parted by hardly less than its length from the border, and by much more than its length from the flexure of the præbrachial; alulae

whitish; halteres testaceous. Length of the body $3\frac{1}{4}$ lines; of the wings 6 lines.

116. *DEXIA PRECEDENS*, n. s. *Fœm.* Cinerea, capite albo lateribus anticis piceis, palpis pedibusque nigris, antennis testaceis, thorace vittis tribus nigris, abdomine basi lateribus fasciæque nigris, punctis lateralibus albis, pedibus longiusculis, alis cinereis, alulis albis.

Female. Cinereous; head white, piceous on each side in front; frontalia deep black, slightly widening to the face, with bristles along each side; facialia without bristles; epistoma not prominent; palpi and legs black; antennæ testaceous, not reaching the epistoma, 3rd joint not thrice the length of the 2nd; thorax with three black stripes, the lateral pair abbreviated hindward; abdomen a little longer than the thorax, black and with white points along each side, black at the base and with a black band on the hind border of the 2nd segment; legs rather long; wings cinereous; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, almost straight from thence to its tip; discal transverse vein nearly straight, parted by less than its length from the border, and by very much more than its length from the flexure of the præbrachial; alulæ white; halteres piceous. Length of the body $2\frac{1}{4}$ lines; of the wings 4 lines.

Gen. *TOBOCCA*, n. g.

Fœm. *Corpus* gracile, sublineare. *Proboscis* palpique brevissimi. *Antennæ* brevissimæ, arista nuda. *Thorax* brevis. *Abdomen* longissimum, thorace plus duplo longius. *Pedes* longissimi. *Alæ* angustæ.

Female. Body slender, nearly linear. Head as broad as the thorax. Proboscis and palpi very short. Antennæ very short, not nearly extending to the epistoma; 3rd joint linear, rounded at the tip, about twice the length of the 2nd; arista bare, stout towards the base, full twice the length of the 3rd joint. Thorax short. Abdomen very elongate-fusiform, more than twice the length of the thorax. Legs very long. Wings narrow.

117. *TOROCCA ABDOMINALIS*, n. s. *Fœm.* Viridis, capite pectoreque albis, proboscide palpisque fulvis, antennis pedibusque nigris, abdomine fulvo segmentorum marginibus posticis vittaque dorsali nigris, alis nigricanti-cinereis, alulis albido-cinereis.

Female. Green, bristly; head and pectus white; frontalia deep black, widening to the face, with a row of bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; proboscis and palpi tawny; antennæ black; abdomen tawny, with a few spines; hind borders of the segments black; 1st segment black at the base, and with a broad black stripe; legs black; wings blackish cinereous; veins black; præbrachial vein forming an almost right angle, and emitting a short stump at its flexure, nearly straight from thence to its tip; discal transverse vein very undulating, parted by about half

length from the border, and by much less than its length from the flexure of the præbrachial; alulæ whitish cinereous. Length of the body $5\frac{1}{2}$ lines; of the wings 8 lines.

Subfam. SARCOPHAGIDES, *Walk.*

Gen. SARCOPHAGA, *Meigen.*

118. *Sarcophaga invaria*, *Walk.* See Vol. III. p. 103.

119. *Sarcophaga aliena*, *Walk.* See Vol. I. p. 22.

120. SARCOPHAGA MENDAX, n. s. *Mas.* Cinerea, capite albo, palpis antennis pedibusque nigris, thorace vittisque lineisque duabus nigris, abdomine tessellato vittis tribus nigris, vittis lateralibus e strigis lanceolatis, alis cinereis, alulis albis.

Male. Cinereous; head white, clothed behind and beneath with cinereous hairs; frontalia deep black, widening towards the face; palpi and antennæ black; thorax with five black stripes, the exterior pair incomplete, the middle cinereous intervals interlined; abdomen tessellated, with three black stripes, the lateral pair forming lanceolate streaks on the 3rd and 4th segments; legs black, very stout; wings grey; veins black; præbrachial vein forming a right angle at its flexure, near which it is curved inward, and is thence almost straight to its tip; discal transverse vein slightly curved near each end, parted by much less than its length from the border, and from the flexure of the præbrachial; alulæ white. Length of the body 6 lines; of the wings 10 lines.

121. SARCOPHAGA INEXTRICATA, n. s. *Flem.* Cinerea, capitis lateribus anticis, palpis, antennis pedibusque nigris, thorace vittis tribus lineisque duabus nigris, abdomine fasciis tribus subinterruptis albidis, alis cinereis, alulis albis.

Female. Cinereous; head with black hairs behind and beneath; frontalia black, broad, slightly widening towards the face; a deep black space on each side of the face; palpi black, rather long; antennæ rather short, not nearly reaching the epistoma, 3rd joint slightly plumose; thorax with three black stripes, the two middle cinereous intervals interlined; abdomen with three broad slightly interrupted whitish bands; legs black, very stout; wings grey; veins black, slightly blackish-bordered; præbrachial vein forming a right angle at its flexure, near which it is curved inward, and is thence straight to its tip; discal transverse vein very slightly undulating, parted by much less than its length from the border and from the flexure of the præbrachial; alulæ white. Length of the body 5 lines; of the wings $8\frac{1}{2}$ lines.

Subfam. MUSCIDES, *Walk.*

Gen. IDIA, *Meigen.*

122. *Idia australis*, *Walk.* See Vol. III. p. 103.

123. *IDIA PROLATA*, n. s. (Group *Rhyncomya*, *Despoidy*). *Fam.* Viridis, sat angusta, capite testaceo frontalibus facie maculisque duabus anticis nigris, antennis halteribusque testaceis, abdomine cyaneo purpureo cupreoque vario fasciis duabus aureo-viridibus, pedibus nigris, alis cinereis basi et apices versus fuscia.

Female. Green, rather narrow, with slight cinereous tomentum; head testaceous, white behind; frontalia and face black and shining, the former linear; a black spot on each side of the peristoma; epistoma rather prominent; eyes bare; antennæ testaceous, not near reaching the epistoma, 3rd joint about thrice the length of the 2nd; abdomen blue, tinged with purple and with cupreous, a little broader than the thorax, with two golden green bands which are widely interrupted above; legs black; wings grey, brown at the base and towards the tips, with the exception of the hind border; veins black; præbrachial vein forming a much rounded and very obtuse angle at its flexure, which is near the border, nearly straight from thence to its tip; discal transverse vein slightly curved outward, parted by much less than its length from the border, and by about its length from the flexure of the præbrachial; alulæ and halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 5 lines.

Gen. *MUSCA*, *Linn.*

124. *MUSCA PROSPERA*, n. s. (Gen. *Silbomyia*, *Macq.*). *Fam.* Auratoviridis, capite argenteo, facie palpis antennis pedibusque nigris, oculis nudis, pectore maculis duabus argenteis, abdomine spinoso, apice purpureo maculis duabus argenteis, alis nigricantibus basi et apud costam nigris, alulis albis. *Var. β.* Thoracis disco cupreo, abdomine subtus cyaneo-purpureo. *Var. γ.* Abdominis disco cupreo, palpis fulvis.

Female. Deep golden green, thickly beset with very stout bristles; head silvery white; vertex green on each side; frontalia piceous, very broad, with long stout bristles on each side; facialia without bristles; face black, deeply keeled, the keel partly white; epistoma slightly prominent; eyes bare; palpi long, subclavate; antennæ almost reaching the epistoma, 3rd joint full four times the length of the 2nd; pectus with a silvery spot on each side; abdomen elongate-oval, a little longer than the thorax, with long stout spines hindward, purple at the tip, where there is a silvery spot on each side; legs black, very stout; wings blackish, black at the base and along part of the costa; veins black; præbrachial vein forming a rounded right angle at its flexure, near which it is curved inward, and is thence straight to its tip; discal transverse vein undulating, parted by more than half its length from the border and by less than half its length from the flexure of the præbrachial; alulæ white. *Var. β.* Disk of the thorax bright cupreous; abdomen blue and purple beneath. *Var. γ.* Like *Var. β*; palpi tawny; disk of the abdomen bright cupreous. Length of the body 7-8 lines; of the wings 12-14 lines.

125. *MUSCA DELECTANS*, n. s. (n. subg. *Isomyia*). *Fam.* *Cupreæ*, capite cinereo lateribus anticis fulvis, palpis fulvis latiusculis, antennis rufescentibus, scutello aurato, viridi-abdominis fasciis pedibusque nigris, alis cinereis apud costam nigricantibus apud venas posticas subluridis, alulis albedo-testaceis, halteribus fulvis.

Female. Bright cupreous, rather long; head cinereous, tawny and somewhat produced on each side of the peristoma; frontalia black, slightly widening towards the face, with a few bristles along each side; facialia without bristles; epistoma somewhat prominent; eyes bare; palpi tawny, rather broad; antennæ reddish, not near reaching the epistoma, 3rd joint about one-third of the length of the 2nd; scutellum mostly golden green; abdomen nearly oval, broader but hardly longer than the thorax, with a black band on the hind border of each segment; legs black; wings grey, blackish along the costa towards the base, slightly lurid along the hinder veins; veins black; præbrachial vein forming a slightly obtuse and rounded angle at its flexure, much curved inward from thence to its tip; discal transverse vein deeply undulating, parted by more than half its length from the border and by much more than half its length from the flexure of the præbrachial; alulæ whitish testaceous; halteres tawny. Length of the body 7 lines; of the wings 12 lines.

126. *MUSCA INGENS*, n. s. (Gen. *Calliphora*, *Desc.*). *Fam.* *Nigricanti-cyanea*, valde setosa, capite albo, palpis antennis pedibusque nigris, pectore cinereo, abdomine spinoso fasciis tribus argenteis late interruptis, alis nigricantibus margine postico cinereo, alulis albidis.

Female. Blackish blue, thickly beset with long stout bristles; head white; frontalia deep black, widening in front, with a few bristles on each side; facialia beset with bristles, except towards the frontalia; palpi and antennæ black, the latter reaching the epistoma, 3rd joint six times the length of the 2nd; pectus and sides of the thorax cinereous; abdomen a little longer and broader than the thorax, with spines towards the tip, and with three broadly interrupted silvery bands; legs black; wings blackish, cinereous along the hind border and in the disks of the hinder areolets; veins black; præbrachial vein forming a right and much rounded angle at its flexure, curved inward beyond, and thence nearly straight to its tip; discal transverse vein slightly undulating, parted by less than half its length from the border, and by full half its length from the flexure of the præbrachial; alulæ whitish. Length of the body 9 lines; of the wings 14 lines.

127. *MUSCA PROMITTENS*, n. s. (Gen. *Ochromyia*, *Macq.*). *Mas et Fem.* Fulva, capite albo, palpis testaceis, tibiis supra tarsisque apice piceis, alis cinereis basi luridis. *Fem.* Abdomine purpurascenti-cyaneo basi fulvo.

Male and Female. Tawny with black bristles; head white; frontalia

piceous, linear, with a few bristles along each side; facialia without bristles; epistoma rather prominent; eyes bare; palpi testaceous; antennæ almost reaching the epistoma, 3rd joint four times the length of the 2nd; abdomen of the female purplish blue, tawny towards the base, broader but not longer than the thorax; tibiæ above, and tarsi towards the tips, piceous; wings grey, lurid towards the base; veins black, tawny towards the base; præbrachial vein forming a right and much rounded angle at its flexure, much curved inward from thence to its tip; discal transverse vein undulating, long, parted by more than half its length from the border, and by less than its length from the flexure of the præbrachial; alulæ testaceous. Length of the body 4-5 lines; of the wings 8-10 lines.

128. *MUSCA FAVILLACEA*, n. s. (n. subg. *Anisomyia*). *Fam.* Fulva, longiuscula, capite antico palpisque testaceis, antennis cinereo-fulvis, thorace vittis tribus cinereis, abdomine nigro basi testaceo fasciis tribus argenteo-cinereis, alis cinereis. *Var. β.* Thorax cinereo, abdomine fulvo cinereo-tessellato segmentis nigro marginatis.

Female. Tawny, rather long, with black bristles; head testaceous in front, whitish and with whitish hairs beneath and hindward; frontalia extremely broad, with a cinereous line, beset with six bristles along each side; facialia without bristles; epistoma prominent; eyes bare; palpi testaceous; antennæ greyish tawny, reaching the epistoma, 3rd joint four times the length of the 2nd; thorax with three indistinct cinereous stripes; abdomen black, elongate-oval, a little longer and broader than the thorax, with a testaceous basal band, and with three silvery grey bands which are testaceous beneath, ventral segments wholly testaceous; wings cinereous; veins black, tawny towards the base; præbrachial vein forming a rounded and obtuse angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein slightly undulating, parted by a little more than half its length from the border, and from the flexure of the præbrachial; alulæ testaceous. *Var. β.* Thorax cinereous; abdomen tawny, tessellated with cinereous, hind borders of the segments black. Length of the body 5-6 lines; of the wings 10-12 lines.

129. *Musca obtusa*, Walk. See Vol. III. p. 105.

130. *Musca flaviceps*, Macq. See Vol. I. p. 23.

131. *MUSCA SELECTA*, n. s. (Gen. *Lucilia*, Desv.). *Fam.* Aureo-viridis, longiuscula, capite testaceo, epistomate elevato, palpis fulvis, antennis pallide rufis, thorace vittis tribus cupreis, pedibus nigris, alis nigricanti-cinereis margine postico cinereo, alulis albidis testaceo marginatis, halteribus fulvis.

Female. Bright golden green, rather long; head testaceous, cinereous and with whitish hairs behind and beneath; frontalia deep black, linear, thickly beset with bristles along each side; epistoma prominent; palpi

tawny; antennæ pale red, not near reaching the epistoma, 3rd joint less than thrice the length of the 2nd; thorax with three slender bright cupreous stripes; abdomen wanting; legs black; wings blackish grey, grey along the hind border; veins black; præbrachial vein forming a very obtuse and much rounded angle at its flexure, slightly curved inward between the flexure and the tip; discal transverse vein undulating, parted by more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulae whitish, with testaceous borders; halteres tawny. Length of the body 5 lines; of the wings 10 lines.

132. *MUSCA SPERATA*, n. s. (Gen. *Lucilia*, *Desc.*). *Mas.* Aureo-viridis, capite nigro-cinereo, proboscide palpis antennis pedibusque nigris, thoracis disco cupreo, alis cinereis basi et apud costam sub-luridis, alulis obscure cinereis.

Male. Golden green; head cinereous black; eyes bare; proboscis, palpi, and antennæ black, the latter not reaching the epistoma; disk of the thorax bright cupreous; abdomen shorter than the thorax; legs black; wings grey, with a lurid tinge at the base and along part of the costa; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, hardly curved inward from thence to its tip; discal transverse vein very slightly curved inward behind the middle, parted by much less than its length from the border, and by hardly less than its length from the flexure of the præbrachial; alulae dark grey. Length of the body 4 lines; of the wings 8 lines.

133. *MUSCA INSCRIBENS*, n. s. (Gen. *Chrysomyia*, *Desc.*). *Fem.* Aureo-viridis, capite albo, palpis fulvis, antennis piceis, abdomine segmentorum marginibus pedibusque nigris, alis cinereis basi nigricantibus, alulis cinereo-albis.

Female. Deep bright green; head white; frontalia black, linear; palpi tawny; antennæ piceous, nearly reaching the epistoma; abdomen almost as long as the thorax, hind borders of the segments black; legs black; wings grey, blackish at the base; veins black; præbrachial vein forming an obtuse and rounded angle at its flexure, hardly curved inward from thence to its tip; discal transverse vein nearly straight, parted by little more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulae cinereous with white borders, the upper pair white. Length of the body 4½ lines; of the wings 8 lines.

134. *MUSCA ELECTA*, n. s. (Gen. *Lucilia*, *Desc.*). *Mas et Fem.* Viridis, capite albo, palpis antennis pedibusque nigris, alis cinereis, alulis albido-cinereis. *Fem.* Frontis lateribus nigris. *Var. β, Mas.* Aureo-viridis.

Male and Female. Bright green; head white, that of the female black and shining on each side of the broad dull black frontalia; antennæ black, nearly reaching the epistoma; abdomen a little broader and shorter than the thorax; legs black; wings grey; veins black; præ-

brachial vein forming a very obtuse and much-rounded angle at its flexure, almost straight from thence to the border; discal transverse vein slightly curved inward in the middle, parted by much less than its length from the border, and by hardly less than its length from the flexure of the præbrachial; alulæ whitish cinereous; lower alulæ of the male dark cinereous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Male, Var. β. Golden-green; the four alulæ dark cinereous.

135. *MUSCA FORTUNATA*, n. s. (Gen. *Chrysomyia*, Desv.). *Mas.* Subaurato viridis, capite albo, palpis fulvis, antennis piceis, abdomine segmentorum marginibus posticis cyaneis, pedibus nigris, alis obscure cinereis basi nigricantibus, alulis albidis.

Male. Bright green, slightly gilded; head white; eyes not contiguous; frontalia black, narrow, linear; palpi tawny; antennæ piceous, nearly reaching the epistoma; abdomen not longer than the thorax, hind borders of the segments dark blue; legs black; wings dark grey, blackish at the base; veins black; præbrachial vein forming an obtuse and slightly-rounded angle at its flexure, almost straight from thence to its tip; discal transverse vein hardly undulating, parted by little more than half its length from the border, and by much more than half its length from the flexure of the præbrachial; alulæ whitish. Length of the body $3-3\frac{1}{2}$ lines; of the wings 6-7 lines.

136. *MUSCA INTRAHENS*, n. s. (Gen. *Lucilia*, Desv.). *Fem.* Cyaneascenti-viridis, capite albo, palpis antennis pedibusque nigris, alis cinereis, alulis obscure cinereis, halteribus testaceis.

Female. Bright bluish green; head white; frontalia dull black; palpi, antennæ, and legs black; abdomen not longer than the thorax; legs black; wings grey; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, straight from thence to its tip; discal transverse vein hardly bent inward, parted by more than half its length from the border, and by about its length from the flexure of the præbrachial; alulæ dark cinereous; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

This species very much resembles *M. electa*, but may be distinguished by its narrower body and by some slight differences in the veins of the wings.

137. *MUSCA OPTATA*, n. s. (Gen. *Pyrellia*, Desv.). *Mas.* Viridis, capite alido, palpis antennis pedibusque nigris, alis cinereis, alulis cinereis testaceo marginatis.

Male. Bright green; head whitish in front; palpi and antennæ black; abdomen a little broader and shorter than the thorax; legs black; wings cinereous; veins black; præbrachial vein forming a gentle curve at the flexure, straight from thence to the tip; discal transverse vein straight, parted by much more than half its length from the border,

and by about its length from the flexure of the præbrachial; alulæ cinereous, with testaceous borders. Length of the body 3-3½ lines; of the wings 6-7 lines.

138. *MUSCA PROFERENS*, n. s. (Gen. *Pyrellia*, *Desc.*). *Mas.* *Nigricanti-viridis*, palpis antennis pedibusque nigris, alis cinereis, alulis obscure cinereis, halteribus apice pallidis.

Male. Blackish-green, shining; eyes contiguous; palpi and antennæ black, the latter nearly reaching the epistoma; abdomen a little broader and shorter than the thorax; legs black; wings cinereous; veins black; præbrachial vein forming a gentle curve at its flexure, straight from thence to its tip; discal transverse vein straight, parted by more than half its length from the border, and hardly more than its length from the flexure of the præbrachial; alulæ dark cinereous; halteres with pale knobs. Length of the body 3 lines; of the wings 6 lines.

139. *Musca refixa*, *Walk.* See Vol. I. p. 26.

140. *MUSCA GAVISA*, n. s. (n. subg. *Neomyia*). *Fem.* *Purpurea*, pubescens, capite nigro, facie subobliqua, palpis antennis pedibusque nigris, abdomine lato crasso, alis fuscescenti-cinereis basi nigricantibus, alulis obscurioribus. *Var. β.* *Viridescenti-cyanea*, scutello purpureo.

Female. Brilliant purple; head black, shining, narrower than the thorax; frontalia dull, linear; face slightly oblique; palpi and antennæ black, the latter not reaching the epistoma; thorax and abdomen with thick black pubescence; abdomen very thick, shorter and much broader than the thorax; legs black; wings brownish grey, blackish at the base; veins black; præbrachial vein forming a much-rounded and very oblique curve at its flexure, hardly curved inward from thence to its tip; discal transverse vein hardly undulating, parted by much more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ dark brownish grey. *Var. β.* Bright greenish blue; scutellum purple. Length of the body 5 lines; of the wings 10 lines.

141. *Musca domestica*, *Linn.* See Vol. I. p. 128.

142. *MUSCA CONDUCENS*, n. s. *Mas.* *Cinerea*, capite albo, palpis antennis pedibusque nigris, thorace vittis duabus latis nigris, abdomine testaceo linea dorsali nigra basi apiceque cinereo-nigris, alis cinereis.

Male. Cinereous; head white; eyes bare; palpi slender, subclavate; antennæ not reaching the epistoma; thorax with two broad black stripes; abdomen dull testaceous, cinereous black at the base and towards the tip, and with a black dorsal line; wings cinereous; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein curved inward, parted by full half its length from the border, and by a little more than its length from the flexure of the præ-

brachial; alulae cinereous. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

143. *MUSCA XANTHOMELA*, n. s. *Fam.* Nigra, capite alido, abdomine ochraceo, alis subeinerascentibus, halteribus pallide testaceis.

Female. Black; head whitish about the eyes, which are red and bare; antennae not reaching the epistoma; abdomen ochraceous, a little shorter than the thorax; wings slightly greyish; veins black, testaceous towards the base; præbrachial vein forming an obtuse angle at the flexure, straight from thence to the border; discal transverse vein straight, parted by less than its length from the border, and by more than its length from the flexure of the præbrachial; halteres pale testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

144. *MUSCA PRÆDICENS*, n. s. (*Gen.* Graptomyza, *Desc.*). *Fam.* Nigra, capite alido-cinereo, palpis antennis pedibusque nigris, thorace vittis quatuor alido-cinereis, abdomine testaceo maculis nigris, alis cinereis, halteribus testaceis.

Female. Black; head whitish cinereous; frontalia deep black, linear, with bristles along each side; facialia without bristles; epistoma not prominent; proboscis and palpi black; antennae reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four stripes, metathorax and pectus whitish cinereous; abdomen testaceous; four black spots on each segment excepting the 1st; legs black; wings cinereous; veins black, testaceous towards the base; præbrachial vein forming a curve at its flexure, which is very near the border; discal transverse vein almost straight, parted by little more than half its length from the border, and by more than its length from the flexure of the præbrachial; alulae and halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

145. *MUSCA COLLECTA*, n. s. *Mas.* Viridis, cinereo tomentosa, capite albo antice testaceo, palpis antennisque fulvis, abdomine testaceo apice viridi linea dorsali nigra, pedibus nigris, tibiis obscure fulvis, alis cinereis, halteribus testaceis.

Male. Green, with cinereous tomentum; head white, testaceous and rather prominent in front; eyes bare, contiguous; epistoma slightly prominent; proboscis black; palpi tawny; antennae tawny, not near reaching the epistoma, 3rd joint not more than twice the length of the 2nd; arista simple, more than twice the length of the 3rd joint; abdomen testaceous, green towards the tip, with a black dorsal line; legs black; tibiae dark tawny; wings grey; veins black, testaceous towards the base; præbrachial vein forming a very obtuse and much-rounded angle at its flexure, from whence it is hardly curved inward to its tip; discal transverse vein curved outward, parted by much more than half its length from the border, and by hardly less than its length from the flexure of the præbrachial; alulae pale cinereous, with testaceous borders; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Subfam. ANTHOMYIDES, *Walk.*Gen. ARICIA, *Macq.*

146. *Aricia significans*, *Walk.* See Vol. III. p. 107.

147. *ARICIA CONTRARIA*, n. s. *Mas et Fœm.* Picea, capite argenteo, palpis pedibusque nigris, antennis testaceis, scutello fulvo, abdomine nigro, alis cinereis basi et apud costam subluridis.

Male and Female. Piceous, head silvery about the eyes; frontalia dull black; palpi and legs black; antennæ testaceous, reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four indistinct cinereous stripes; scutellum tawny; abdomen black, shining, a little broader but not longer than the thorax; wings grey, rather broad, with a lurid tinge towards the base and along the costa; veins black, tawny towards the base; discal transverse vein hardly undulating, or slightly curved inward, parted by much more than its length from the præbrachial, and by much less than its length from the border. Length of the body 3-4 lines; of the wings 6-8 lines.

148. *ARICIA INTEGRA*, n. s. *Mas.* Testaceo-cinerea, capite albo, palpis nigris, antennis testaceis basi nigris, thorace lineis quatuor nigris postice obsolete, pedibus fulvis, tarsis piceis, alis cinereis apud costam subluridis, halteribus testaceis.

Male. Testaceous-cinereous; head white; frontalia deep black, widening in front; palpi black; antennæ testaceous, black at the base, nearly reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four black lines which are obsolete hindward; abdomen nearly oval, not longer than the thorax; legs tawny; tarsi piceous; wings grey, with a slight lurid tinge towards the costa; veins black; discal transverse vein curved inward towards the base, parted by about its length from the præbrachial transverse, and by much less than its length from the border; alulæ and halteres testaceous. Length of the body 3½ lines; of the wings 7 lines.

149. *ARICIA NIGRICOSTA*, n. s. *Mas et Fœm.* Cinerea, capite argenteo, palpis nigris, antennis piceis, thorace vittis quatuor nigris, abdomine maculis quatuor nigris, pedibus fulvis, alis cinereis apud costam subluridis, costa nigra.

Male and Female. Cinereous; head silvery white; palpi black; antennæ piceous, tawny at the base, reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four black stripes; abdomen nearly oval, not longer than the thorax, 2nd and 3rd segments with two black spots on each; legs tawny; tarsi black; wings cinereous, with a lurid tinge along the costa, which is black; veins black, tawny towards the base; discal transverse vein slightly bent inward, parted by about its length from the præbrachial transverse, and by much less than its length from the border. Length of the body 4 lines; of the wings 8 lines.

Gen. SPILOGASTER *Macq.*

150. SPILOGASTER XANTHOCERAS, n. s. *Fam.* Alba, capite argenteo, palpis pedibusque nigris, antennis pallide testaceis basi nigris, thoracis fascia lata scutelloque nigris, thorace vitta fasciisque duabus nigris, alis cinereis apud costam subluridis.

Female. White; head silvery white; frontalia broad, deep black; proboscis, palpi, and legs black; antennæ pale testaceous, reaching the epistoma, black at the base, 3rd joint about four times the length of the 2nd; thorax with a broad black band; scutellum black; abdomen cinereous, elongate, with a slender black stripe and with two black bands; wings cinereous, with a lurid tinge along the costa; veins black, tawny towards the base; discal transverse vein bent inward towards the base, parted by hardly more than its length from the præbrachial transverse, and by much less than its length from the border; alulae white. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Gen. ANTHOMYIA, *Meigen.*

151. Anthomyia procellaria, *Walk.* See Vol. III. p. 108.

Gen. LISPE, *Meigen.*

152. LISPE BIMACULATA, n. s. *Fam.* Nigra, capite atro antice aurato subtus albido, pectore pedibusque cinereis, abdomine vitta cinerea maculis duabus subapicalibus albis, femoribus intermediis basi dilatatis, alis cinereis, halteribus testaceis.

Female. Black; head deep black above, gilded in front, whitish on each side beneath; pectus and legs cinereous; abdomen with a slender cinereous stripe, and with a white spot on each side near the tip; knees pale; middle femora dilated at the base; wings cinereous; veins black, tawny at the base; discal transverse vein parted by less than its length from the border, and by about twice its length from the præbrachial transverse; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

Gen. CÆNOSIA, *Meigen.*

153. CÆNOSIA LUTEICORNIS, *Walk.* (see Vol. III. p. 108). *Fam.* Cana, capite aurato, frontilibus pedibusque fulvis, palpis albis, antennis pallide luteis, abdomine subtestaceo apice cano maculis quatuor nigris, alis cinerascensibus, halteribus testaceis.

This is probably the female of *C. luteicornis*, though the wings have no trace of an apical spot.

Female. Hoary; head pale gilded, hoary behind and beneath; frontalia tawny, widening slightly in front; palpi white; antennæ pale luteous, reaching the epistoma, 3rd joint linear, rounded at the tip, six times the length of the 2nd; arista plumose to full half its length; abdomen dull testaceous, hoary towards the tip, where it is very bristly

above, 3rd and 4th segments with a black dorsal spot on each, 4th and 5th segments with a black spot on each side; legs tawny; tarsi piceous; wings greyish; veins black, testaceous at the base; discal transverse vein parted by a little less than its length from the border, and by much more than its length from the præbrachial transverse; alulæ pale cinereous; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

154. *CÆNOSIA SIGNATA*, n. s. *Fæm.* Cinereo-fulva, capite antennis pedibus halteribusque testaceis, thoracis vittis quatuor scutelli disco abdominisque vitta nigra, alis cinereis subluridis.

Female. Cinereous-tawny; head testaceous, white about the eyes; antennæ testaceous, not near reaching the epistoma, 3rd joint elongate-conical, about twice the length of the 2nd; arista plumose to the tip; thorax with four black stripes, the outer pair interrupted; disk of the scutellum black; abdomen with a black stripe, which is interrupted on the hind border of each segment; legs testaceous; wings grey with a slight lurid tinge; veins tawny, costal vein black, discal transverse vein parted by little more than half its length from the border, and by about twice its length from the præbrachial transverse; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

155. *CÆNOSIA RESPONDENS*, n. s. *Fæm.* Cana, capite apud oculos albo, palpis albidis, antennis halteribusque testaceis, thorace lineis tribus nigris, abdomine subfusiformi e maculis nigris trivittato, pedibus nigris, femoribus apice tibiisque fulvis, alis cinereis, alulis albis.

Female. Hoary; head white about the eyes; frontalia reddish; palpi whitish; antennæ testaceous, 3rd joint long, slender, nearly reaching the epistoma; thorax with three black lines; abdomen nearly fusiform, a little longer than the thorax, with three black spots on each segment, legs black, femora towards the tips and tibiæ tawny; wings grey; discal transverse vein parted by about twice its length from the præbrachial transverse, and by about its length from the border; alulæ white; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Subfam. HELOMYZIDES, *Fallen.*

Gen. *XARNUTA*, *Walk.*

156. *Xarnuta leucotelus*, *Walk.* See Vol. I. p. 28.

Gen. *CORDYLURA*, *Fallen.*

157. *CORDYLURA BISIGNATA*, n. s. *Mas.* Nigra, vix nitens, antennis breviusculis, arista pubescente, abdomine cylindrico maculis duabus lateralibus albis, pedibus non spinosis, alis obscure cinereis, alulis albis.

Male. Black, hardly shining; head white behind, testaceous towards the epistoma; antennæ not near reaching the epistoma. 3rd joint

linear, rounded at the tip, full twice the length of the second; arista pubescent; abdomen cylindrical, a little longer than the thorax, with a white spot on each side in the middle; legs unarmed, moderately long; wings dark grey; veins black; discal transverse vein straight, upright, parted by a little less than its length from the border, and by full twice its length from the præbrachial transverse; alulae white. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

Gen. HELOMYZA, *Fallen.*

158. HELOMYZA OBSERVANS, n. s. *Mas.* Fulva, antennarum articulo 3^o conico brevi, arista plumosa, abdomine guttis quatuor dorsalibus nonnullisque ventralibus nigris, segmentis albido marginatis, alis subcinereis.

Male. Tawny, with a few black bristles; antennæ short, 3rd joint conical, less than twice the length of the 2nd; arista plumose; abdomen conical, not longer than the thorax, hind borders of the segments whitish, fourth segment with a black dot, fifth segment with three black dots, some black dots along each side beneath; wings greyish; veins black, testaceous at the base; discal transverse vein straight, upright, parted by full half its length from the border, and by nearly twice its length from the præbrachial transverse. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

159. HELOMYZA TRIPUNCTIFERA, n. s. *Fam.* Fulva, antennarum articulo 3^o conico, arista plumosa, abdomine fasciis pallidis guttaque apicali atra, alis cinereis antice subluridis.

Female. Tawny, with black bristles; head whitish about the eyes; third joint of the antennæ conical, hardly twice the length of the 2nd; arista plumose to the tip; abdomen with a pale band on the hind border of each segment, and with a black apical dot; wings grey, with a lurid tinge in front; veins black; discal transverse vein straight, upright, clouded with brown, parted by less than its length from the border, and by more than twice its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

160. HELOMYZA COPIOSA, n. s. *Fam.* Cinerea, capite vitta testacea, antennis fulvis brevissimis basi nigris, arista plumosa, thorace maculis plurimis fuscis, scutello fulvo basi nigro, abdomine nigro vitta et segmentorum marginibus posticis fulvis, tibiis fulvo cinctis, alis cinereis nigricante maculatis.

Female. Cinereous; head slightly ferruginous, with a dull testaceous stripe on the front, whitish about the eyes; epistoma not prominent; antennæ tawny, black towards the base, very short, not extending beyond half the length of the face, 3rd joint conical, much longer than the 2nd; arista plumose; thorax with three rows of various brown spots; scutellum tawny, black at the base; pectus with brown spots; abdomen black, oval, not longer than the thorax, with a stripe

and the hind borders of the segments tawny: legs black, short; tibiae tawny, black at the base and at the tips: wings grey, slightly lurid in front, with numerous partly confluent blackish spots; veins black; discal transverse vein straight, upright, parted by much less than its length from the border, and by about twice its length from the præbrachial transverse; halteres tawny. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. SCIOMYZA, *Fallen.*

161. SCIOMYZA REPLENA, n. s. *Fam.* Picea, capite ferrugineo lituris albis, antennis pedibus thoracisque vittis quatuor rufescentibus, abdomine nigro fasciis rufescentibus, femoribus nigris, tibiis nigro bifasciatis, alis nigricantibus albido trifasciatis margine postico cinereo.

Female. Piceous; head with several black bristles, white about the eyes, ferruginous above, with a white transverse line hindward, with a partly black partly white mark on each side, and with an abbreviated whitish streak in the middle; antennæ reddish, piceous towards the tips, 3rd joint conical, less than twice the length of the 2nd; arista plumose; thorax with four reddish stripes, the outer pair incomplete; abdomen black, with a reddish band on the fore border of each segment; legs reddish, femora black, tibiae with two black bands; wings blackish, with three irregular abbreviated whitish bands, cinereous along the hind border; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by nearly twice its length from the præbrachial transverse; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

162. SCIOMYZA? LEUCOMELANA, n. s. *Fam.* Picea, nitens, subtus alba, capite plano, antennis rufis apice nigris, arista plumosa, abdomine nigro, pedibus halteribusque testaceis, alis nigricantibus acutis.

Female. Piceous, shining; head flat above, a little narrower than the thorax; epistoma, sides of the peristoma, under side and disk of the pectus white; antennæ red, reaching the epistoma, third joint elongate-conical, black towards the tip; arista plumose; scutellum large; abdomen oval, black, hardly longer or broader than the thorax; legs short, testaceous; wings blackish, paler along the hind border, rather pointed at the tips; costa very convex; veins black, radial vein slightly curved, cubital vein and præbrachial vein converging towards the tip; discal transverse vein nearly straight and upright, parted by more than its length from the border, and by nearly twice its length from the præbrachial transverse; halteres testaceous. Length of the body 2 lines; of the wings 4 lines.

Gen. AMBLADA, n. g.

- Fam.* Corpus sat robustum. Caput transversum, thorace vix angustius. Antennæ capit latitudine breviores; articulus 3^{us} lanceolatus,

2° longior; arista pubescens. *Abdomen* brevi-ovatum, thorace multo brevius. *Pedes* simplices. *Alæ* mediocres.

Female. Body moderately stout. Head transverse, almost as broad as the thorax, somewhat flat above; proboscis and palpi very short. Antennæ shorter than the breadth of the head; 3rd joint lanceolate, longer than the 2nd; arista pubescent. Abdomen short-oval, much shorter than the thorax. Legs simple, moderately long. Wings of moderate size; veins of the usual structure.

163. *AMBLADA ATOMARIA*, n. s. *Fam.* Cinerea, capite guttis quatuor fuscis maculisque duabus atris, arista alba filiformi, thorace lineis duabus punctisque plurimis fuscis, abdomine fulvo segmentorum marginibus nigro punctatis, pedibus fulvis, tibiis albidis nigro bifasciatis, alis lurido-cinereis.

Female. Cinereous; head white about the eyes, with two brown dots on each side of the vertex, and with a deep black spot on each side in front; antennæ cinereous-brown; arista white, filiform, seated on the base of the 3rd joint, which it much exceeds in length; thorax with two slender brown lines and with very numerous brown points; abdomen tawny, with black points on the hind borders of the segments; legs tawny; tibiæ dingy whitish, with two black bands on each; wings grey, with a lurid tinge; veins tawny, black by the costa at the base; discal transverse vein straight, upright, parted by less than its length from the border, and by full twice its length from the præbrachial transverse; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Gen. *SEPEDON*, *Latr.*

164. *Sepedon Javanensis*, *Desv. Essai Myod.* 677. 2.

Inhabits also Java.

Subfam. *LAUXANIDES*, *Walk.*

Gen. *LONCHÆA*, *Fallen.*

165. *LONCHÆA*? *PUNCTIPENNIS*. *Fam.* Nigra, nitens, capite antico argenteo, antennarum articulo 3. longe-conico, arista plumosa, tarsis halteribusque piceis, alis cinereis basi nigris puncto costali nigro.

Female. Black, shining, with several stout bristles; head silvery in front; face flat; antennæ short; third joint elongate-conical, arista very plumose; abdomen oval, convex, a little shorter and narrower than the thorax; tarsi and halteres piceous; wings grey, black at the base, with a black costal point at the tip of the subcostal vein; veins yellowish, black at the base; costal vein black; discal transverse vein straight, upright, parted by less than its length from the border, and by nearly twice its length from the præbrachial transverse. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

166. *LONCHŒA*? *CONSENTANEA*, n. s. *Fœm.* Nigra, nitens, arista nuda, abdomine cyanescente-nigro, alis cinereis, halteribus albis.

Female. Black, shining; antennæ black, nearly reaching the epistoma; 3rd joint linear, about thrice the length of the 2nd; arista simple; abdomen bluish black; wings grey; veins black, testaceous at the base; discal transverse vein straight, upright, parted by less than its length from the border and by more than twice its length from the præbrachial transverse; halteres white. Length of the body 2 lines; of the wings $3\frac{1}{4}$ lines.

167. *LONCHŒA*? *ATRATULA*, n. s. *Fœm.* Atra, pubescens, antennis epistoma attingentibus, arista plumosa, abdomine subovato, alis nigricantibus.

Female. Deep black, pubescent, not shining; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista plumose; abdomen somewhat oval, a little broader but hardly longer than the thorax; wings blackish; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by about twice its length from the præbrachial transverse. Length of the body 2 lines; of the wings $3\frac{1}{4}$ lines.

Gen. *THRESSA*, n. g.

Fœm. *Corpus* breve, crassum. *Caput* thorace multo latius. *Oculi* magni. *Antennæ* epistoma fere attingentes; articulus 3^{us} linearis, 2^o plus duplo longior; arista plumosa. *Abdomen* subovatum, thorace non longius. *Pedes* longiusculi. *Alæ* parvæ.

Female. Body short, thick. Head much broader than the thorax; front wide. Eyes large. Antennæ nearly reaching the epistoma; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista plumose. Thorax a little longer than broad; scutellum rather prominent. Abdomen nearly oval, not longer than the thorax. Legs rather short. Wings small; costal vein ending at the tip of the wing; radial vein very near the costa; cubital vein ending at a little in front of the tip; transverse veins much retracted, very short.

168. *THRESSA* *SIGNIFERA*, n. s. *Fœm.* Nigra, nitens, capite cyaneo, antennis pedibusque fulvis, thorace strigis duabus lateralibus albis, femoribus nigris, alis hyalinis apud costam nigris, halteribus albis. *Var. β.* Alis apud costam hyalinis macula apicali nigra.

Female. Black, shining; head blue; antennæ tawny; thorax with a white transverse streak on each side; legs tawny; femora black, with tawny tips; wings hyaline, black along the costa; veins black; discal transverse vein parted by four times its length from the border, and by six times its length from the præbrachial transverse; halteres white. *Var. β.* Wings not black along the costa, with the exception of a black apical spot. Length of the body $1\frac{1}{2}$ line; of the wings $2\frac{1}{4}$ lines.

Gen. OCHTHIPHILA, *Fallen.*

169. OCHTHIPHILA DISCOGLAUCA, n. s. *Fam.* Fusca, capite thoracisque disco glucescente-albidia, arista plumosa, thorace lineis duabus lateralibus albidis, abdomine lineis transversis vittaque albidia, tibiis tarsisque rufescentibus, alis cinereis, halteribus testaceis.

Female. Brown; head glaucous-whitish; antennæ black, nearly reaching the epistoma; third joint conical, arista plumose; thorax with a very broad glaucous-whitish stripe, a whitish line on each side and two on each side of the pectus; abdomen oval, a little shorter than the thorax, with a whitish band on the hind border of each segment and with a whitish stripe, the whitish hue appearing tawny in some aspects; tibiæ and tarsi reddish; wings grey; veins black; discal transverse vein straight, upright, parted by much less than its length from the border, and by nearly twice its length from the præbrachial transverse; halteres testaceous. Length of the body 2 lines; of the wings 4 lines.

Gen. CELYPHUS, *Dalman.*

170. Celyphus obtectus, *Dalman.* See Vol. I. p. 30.

171. Celyphus scutatus, *Wied.* See Vol. I. p. 131.

Subfam. ORTALIDES, *Haliday.*Gen. LAMPROGASTER, *Macq.*

172. Lamprogaster marginifera, *Walk.* See Vol. II. p. 111.

Gen. PTEROGENIA *Bigot, MSS.*

Mas et Fam. *Platystomati* affinis. Corpus breve, latum, crassum. Caput thorace latius, antice planum, genis dilatatis. Antennæ parvæ; articulus 3^{us} longi-conicus; arista plumosa. Thorax subconvexus; scutellum magnum. Abdomen thorace brevius et angustius. Pedes breves, validi; tibiæ arcuatæ. Alæ sat parvæ; alulæ maximæ. *Mas.* Genæ angulatæ, valde dilatatæ.

This genus is allied to *Platystoma*, and more especially to *Trigonosoma*.

Male and Female. Body short, broad, thick. Head broader than the thorax, flat in front; vertex broad; sides of the face or genæ dilated; epistoma rather prominent. Eyes oblong. Antennæ small, resting in the cavity of the broad face; 3rd joint elongate-conical, more than twice the length of the 2nd; arista plumose. Thorax compact, slightly convex; scutellum large, conical. Abdomen short, conical, shorter and narrower than the thorax. Legs short, stout; tibiæ curved, especially the hind pair. Wings rather small; alulæ very large. *Male.* Sides of the face more dilated than those of the female, and forming an angle or short horn on each side.

173. PTEROGENIA SINGULARIS, *Bigot, MSS.* *Mas et Fam.* Nigra, nitens, capite flavescente-albo fasciis quatuor nigris, antennis pallide

luteis basi nigris, abdominis segmentis flavo marginatis, tarsis albis apice nigris, alis subcinereis dimidio basali lutescente fasciis contiguus fuscis, fascia strigisque exterioribus fuscis, halteribus fulvis.

Male and Female. Black, shining. Head yellowish-white, with four black bands; 1st band on the vertex, broader than the others; 2nd across the base of the antennæ; 3rd in front of the face; 4th on the epistoma; antennæ pale luteous, black at the base; hind borders of the abdominal segments yellow; sides dark tawny towards the base; legs pubescent; tarsi white, with black tips; wings slightly cinereous; basal half somewhat luteous, with several partly confluent brown bands, exterior part with one brown band and with several transverse brown streaks; veins black, pale luteous exteriorly; discal transverse vein slightly curved outward, parted by about one-third of its length from the border, and by more than its length from the præbrachial transverse; alulæ white; halteres tawny. Length of the body 3 lines; of the wings 7 lines.

Gen. PLATYSTOMA, Latr.

174. PLATYSTOMA ATOMARIUM, n. s. *Mas.* Cinereum, nigro pulverosum, facie alba nigro biguttata, antennis pedibusque nigris, arista plumosa, pectore albidio, alis nigricantibus guttis plurimis limpidis.

Male. Cinereous; head flat above, white about the eyes; face white, with a black dot on each side in front; antennæ black, nearly extending to the peristoma; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista plumose; thorax with numerous lines of minute black points; pectus whitish, with black points; abdomen oval, powdered with black, not longer than the thorax; legs short, stout, black; wings blackish, covered with limpid dots, excepting a narrow oblique band on the transverse veins; veins black; discal transverse vein straight, upright, parted by less than half its length from the border, and by a little more than half its length from the præbrachial transverse. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

175. PLATYSTOMA BASALE, n. s. *Fæm.* Cinerea, capite lineis tribus albidis, antennis basi nigris, arista plumosa, thorace vittis indistinctis fuscis maculisque lateralibus nigris testaceo-marginatis, scutello nigro vitta cinerea, abdominis segmentis albidio-marginatis, femoribus anticis tibiisque albidio fasciatis, alis subcinereis lituris transversis fascia exteriore costam versus dilatata fasciæque subapicali nigricantibus, halteribus albis.

Female. Cinereous; head white about the eyes and beneath, and with three whitish lines on the front; epistoma not prominent; proboscis large; antennæ black towards the base, not near reaching the epistoma; 3rd joint elongate-conical, about twice the length of the 2nd; arista plumose; thorax with indistinct brown stripes, and on each side

with black shining testaceous-bordered spots; scutellum black, shining, with a cinereous stripe; abdomen cinereous-black, oval, tawny on each side at the base, a little shorter and narrower than the thorax; hind borders of the segments whitish; legs black; tibiae and fore femora with a whitish band on each; wings slightly greyish, with several irregular transverse blackish marks near the base, with a broad exterior blackish band, which is dilated and contains a whitish streak towards the costa, and with an irregular subapical blackish band; veins black; discal transverse vein nearly straight and upright, parted by more than half its length from the border, and by nearly twice its length from the præbrachial transverse; halteres white. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

Gen. DACUS, *Fabr.*

176. DACUS DIVERGENS, n. s. *Mas.* Purpureus, longus, angustus; fronte tumida, facie carinata fulvo maculata, palpis fulvis, antennis piceis, arista alba subpubescente, thorace vittis tribus cinereis, abdomine fusiformi apicem versus cylindrico et cyaneo, pedibus piceo-nigris, femoribus fulvis, tarsis posticis rufescentibus, alis cinereis apices versus et apud venas transversas fuscis, halteribus albidis-flavis.

Male. Bluish purple, long, slender; head whitish about the eyes; front tumid, convex; face keeled, with a large elongated tawny spot; palpi tawny; antennae piceous, reaching the epistoma, tawny at the base; 3rd joint linear, conical at the tip, six times the length of the 2nd; arista white, minutely pubescent, very much longer than the 3rd joint; thorax slightly compressed, with three cinereous stripes; pectus cinereous; abdomen fusiform, cylindrical, and mostly blue towards the tip, very much longer than the thorax; legs piceous black; femora tawny; hind tarsi reddish except at the tips; wings cinereous, brown on the fore part towards the tips and about the transverse veins, the brown part including a curved cinereous streak between the cubital and præbrachial veins; veins black; præbrachial vein very slightly undulating; discal transverse vein curved outward, parted by one-fourth of its length from the border, and by much more than its length from the oblique præbrachial transverse; halteres whitish yellow. Length of the body 7 lines; of the wings 12 lines.

The genus *Dacus* includes many distinct forms, and will probably be soon divided into numerous subgenera; the characters of the preceding species differ much from those of the type, *D. Oleæ*. Some of the following species may belong to *Senopterina*, Macq.

177. DACUS ADDENS, n. s. *Fam.* Cyaneus, longus, angustus, capite nigro, facie plana perobliqua, arista cinerea nuda, thorace vittis tribus cinereis, abdomine æneo-viridi, tibiis tarsis halteribusque nigris, alis cinereis apud costam et apud venam transversam discalem nigricantibus.

Female. Blue, long, narrow; head black, depressed above, white about the eyes; face very oblique, forming before the front a protuberance on which the antennæ are seated, its fore part oblong quadrate, almost flat, with whitish furrows for the antennæ; palpi and antennæ black, the latter reaching the epistoma; 3rd joint linear, rather obtuse at the tip, six times the length of the 2nd; arista cinereous, bare, hardly longer than the 3rd joint; thorax with three indistinct cinereous stripes; abdomen seneous-green, nearly linear, slightly compressed, much longer than the thorax; oviduct protuberant, slender; legs short, stout; tibiae and tarsi black; wings grey, blackish along the costa and about the transverse veins; veins and halteres black; discal transverse vein straight, upright, parted by full one-fourth of its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 6 lines; of the wings 12 lines.

178. *DACUS BILINEATUS*, n. s. *Fam.* Fulvus, longiusculus, nigro bivittatus, capite antennisque rufescentibus, arista plumosa, palpis porrectis; pedibus breviusculis nigro fasciatis, alis cinereis, costa venaque transversa discali fusco nebulosis, halteribus testaceis.

Female. Tawny, rather long; head reddish in front; epistoma rather prominent; palpi porrect; antennæ reddish, nearly reaching the epistoma; 3rd joint linear, rounded at the tip, about thrice the length of the 2nd; arista somewhat plumose; thorax elongate-elliptical, with two black stripes; abdomen lanceolate, shining, with two broad black stripes, longer than the thorax; legs rather short, with diffuse black bands; wings grey, brownish along the costa and about the discal transverse vein; veins black, tawny at the base; discal transverse vein nearly straight and upright, parted by one-fourth of its length from the border, and by much more than its length from the præbrachial transverse; halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

179. *DACUS IMITANS*, n. s. *Fam.* Cyaneus, angustus, capite atro, antennis pedibusque nigris, tarsis posticis basi albidis, alis cinereis, costa vittaque nigris, halteribus piceis.

This species is closely allied to *D. longivitta*, and *D. exigens* and *D. contrahens* belong to the same group.

Female. Dark blue, narrow, with slight cinereous tomentum; head deep black above, white about the eyes; peristoma very prominent; proboscis large; antennæ black, nearly reaching the epistoma; 3rd joint linear, conical at the tip, about four times the length of the 2nd; arista bare, slender; abdomen fusiform, narrower and a little longer than the thorax; oviduct protuberant, slender; legs black, moderately long; first joint of the hind tarsi whitish above; wings cinereous, black along most of the costa to the tips, and black on the space between the cubital and præbrachial veins as far as the præbrachial transverse vein; discal transverse vein straight, upright, parted by

less than half its length from the border, and by very much more than its length from the præbrachial transverse; halteres piceous. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

180. *DACUS EXIGENS*, n. s. *Mas*. Viridescens cyaneus, angustus, capite rufescente piceo, antennis luteis, arista nuda, thorace vittis tribus cinereis, pedibus fulvis, alis cinereis striga costali apiceque fuscis, halteribus testaceis.

Male. Greenish blue, narrow; head reddish, piceous above, white about the eyes, black in front; antennæ luteous, reaching the epistoma; 3rd joint slightly lanceolate, full four times the length of the 2nd; arista slender, simple; thorax with three cinereous stripes; abdomen almost cylindrical, much longer than the thorax; legs tawny; tarsi black towards the tips; wings grey, brown at the tips and with a brown streak on the middle of the costa; veins black, tawny towards the base; discal transverse vein straight, upright, clouded with brown, parted by less than half its length from the border, and by much more than its length from the præbrachial transverse; halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings $5\frac{1}{2}$ lines.

181. *DACUS CONTRAHENS*, n. s. *Fæm*. Cyaneus, angustus, capite supra atro apud oculos albo, antennis luteis, thorace vittis tribus cinereis, pedibus piceis, alis cinereis vitta costali interrupta nigricante, vena transversa discali nigricante nebulosa, halteribus albidis.

Female. Dark blue, narrow; head deep black above, white about the eyes, piceous in front; antennæ luteous, reaching the epistoma; 3rd joint linear, conical at the tip, about six times the length of the 2nd; arista slender, simple; thorax with three cinereous stripes; abdomen compressed, a little longer than the thorax; legs piceous; wings grey, with a blackish interrupted costal stripe, which is dilated at the tip of the wing; veins black; discal transverse vein clouded with blackish, parted by half its length from the border, and by a little more than its length from the præbrachial transverse; halteres whitish. Length of the body 3 lines; of the wings 5 lines.

182. *DACUS INAPTUS*, n. s. *Mas et Fæm*. Viridis, capite atro, facie fulva basi alba, antennis piceis, pedibus halteribusque nigris, alis angustis cinereis.

Male and Female. Green, with slight cinereous tomentum; head deep black, white about the eyes; face tawny, white at the base; antennæ piceous, reaching the epistoma; 3rd joint lanceolate, full four times the length of the 2nd; arista bare, long, slender; thorax long, slightly compressed; abdomen slightly compressed at the base, linear, narrower and a little shorter than the thorax in the male, fusiform and much attenuated towards the tip in the female; legs black, moderate long; wings narrow, cinereous; veins black, straight; discal transverse vein straight, upright, parted by less than half its length from the border, and by almost twice its length from the præbrachial

verse; halteres black. Length of the body $3\frac{1}{2}$ – $4\frac{1}{2}$ lines; of the wings 6–8 lines.

183. *DACUS TERMINIFER*, n. s. *Fam.* Niger, nitens, breviusculus, capite rufescente, antennis fulvis, arista nuda, scutello pectorisque maculis duabus flavis, pedibus breviusculis, tibiis anterioribus femoribus posticis basi tarsisque albidis, alis vitreis, striga costali puncto apicali vittaque postica nigricantibus, halteribus testaceis.

Female. Black, shining, rather short; head reddish above; antennæ tawny, reaching the epistoma; 3rd joint linear, piceous towards the tip, which is rounded, about six times the length of the 2nd; arista slender, bare; scutellum dull yellow; pectus with an oblique yellow spot on each side; abdomen hardly broader than long, a little broader and shorter than the thorax; legs rather short; tarsi and anterior tibiæ whitish; hind femora whitish towards the base; wings vitreous, with a short black stripe extending from the base to near the hind border; costa with a blackish streak in the middle and with a blackish apical point; discal transverse vein straight, upright, parted by about one-third of its length from the border, and by more than its length from the præbrachial transverse, which is oblique and unusually long; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

184. *DACUS EMITTENS*, n. s. *Mas et Fam.* Fulvus, facie brevi nigro biguttata, antennis pallide luteis, arista nuda, thorace lineis quinque rufescentibus, disco nonnunquam nigricante-cinereo, scutello callisque humeralibus flavis, abdomine nigro-fasciato, alis vitreis fusco plus minusve strigatis, halteribus albido-testaceis.

Male and Female. Tawny, convex, minutely pubescent; face short, with a black dot on each side; antennæ pale luteous, reaching the epistoma; 3rd joint linear, conical at the tip, full four times the length of the 2nd; arista slender, bare, much longer than the 3rd joint; thorax with five reddish lines; scutellum and humeral calli yellow; metathorax with a blackish mark on each side; abdomen short, oval, broader than the thorax, concave beneath, from whence in the female the lanceolate apical part proceeds; a protuberance on each side at the base, and a black middle band, behind which there is a slight longitudinal black line; wings vitreous, lurid and partly brown along the costa, brown along the subanal vein, and brown about the tips, excepting most of the space between the discal transverse vein and the border; veins tawny, partly black, slightly deviating; discal transverse vein nearly straight, parted by about one-third of its length from the border, and by more than its length from the oblique and rather long præbrachial transverse; halteres whitish testaceous. *Var. β.* Abdomen with two black bands. *Var. γ, Male.* Discal transverse vein not clouded with brown. *Var. δ, Male.* Præbrachial transverse vein clouded with brown. *Var. ε, Male.* Disk of the thorax blackish grey; wings vitreous, excepting a slight brown line along the costa.

and another along the subanal vein. *Var. ζ. Male.* Abdomen with a black interrupted subapical band. Length of the body 3-6 lines; of the wings 5-10 lines.

This species is closely allied to *D. ferrugineus* and to *D. trivittatus*, but may be distinguished by the luteous hue along the costa.

185. *DACUS DIFFUSUS*, n. s. *Fam.* Testaceus, facie nigro fasciata, palpis nigro notatis, thoracis vittis duabus angustis abbreviatis et metathoracis fasciis duabus angustis nigris, abdomine fusiformi, alis subcinereis apud venas fuscescente subnebulosis.

Female. Testaceous, not shining; head paler about the eyes, with a black band on the face near the epistoma; palpi with a black mark on each outer side; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, more than four times the length of the 2nd; arista bare; thorax with two narrow abbreviated black stripes; metathorax with two slender black bands; abdomen fusiform, narrower and a little longer than the thorax; legs moderately long; wings slightly greyish, irregularly clouded with very pale brown about the veins; the latter black, testaceous towards the base; discal transverse vein straight, upright, parted by about one-fourth of its length from the border, and by much less than its length from the præbrachial transverse, which is undulating and very oblique. Length of the body 4 lines; of the wings 7 lines.

186. *DACUS FULVITARSIS*, n. s. *Fam.* Niger, longiusculus, capite apud oculos albo, antennis piceis, abdomine lanceolato, femoribus basi fulvis, metatarsis subdilatis, tarsis posterioribus fulvis, alis cinereis nigricante nebulosis, halteribus testaceis.

Female. Black, rather long and narrow; head white about the eyes; face small; antennæ piceous, short; 3rd joint nearly round, a little longer than broad; arista long, bare; thorax elongate; abdomen lanceolate, longer than the thorax; femora tawny at the base; metatarsi slightly dilated; posterior tarsi tawny, with black tips; wings grey, partly clouded with blackish; veins black; discal transverse vein straight, upright, parted by about twice its length from the border, and by about thrice its length from the præbrachial transverse; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. CALLANTRA, n. g.

Fam. *Corpus* convexum. *Caput* thorace vix angustius. *Palpi* distincti, porrecti. *Antennæ* longæ, petiolo aut articulo 1° communi, arista nuda. *Thorax* brevis. *Abdomen* petiolatum, postice ovatum et valde convexum, subtus concavum. *Pedes* mediocres. *Alæ* sat angustæ.

Female. Body convex. Head almost as broad as the thorax; face vertical; palpi distinct, porrect; antennæ long, seated on a common petiole or first joint, with which the succeeding part forms a right angle; 3rd joint very slightly increasing in breadth from the base to

the tip, full thrice the length of the 2nd joint, which is rather long; arista bare, slender, a little longer than the 3rd joint. Thorax short. Abdomen petiolated, oval and very convex hindward, concave beneath, very much longer than the thorax. Legs moderately long. Wings rather narrow.

187. *CALLANTRA SMIEROIDES*, n. s. *Fem.* Fulva, facie nigro-biguttata, antennis testaceis, thoracis fascia, scutello, callis duobus humeralibus, pectoris lituris duabus, abdominis fasciis duabus lituraque subapicali flavis, alis subcinereis apud costam fuscescentibus, halteribus testaceis.

Female. Tawny; head testaceous about the eyes; face with a black dot on each side; antennæ testaceous, extending beyond the epistoma; thorax with two yellow humeral calli, and with a yellow band which is continued on each side of the pectus, the latter having a yellow mark on each side hindward; scutellum yellow; abdomen with the hind borders of the 1st and 2nd segments yellow; a yellow capitate subapical mark, which is dilated on each side; wings slightly grey, brownish along the costa; veins black, tawny towards the base; a lurid tinge along the subanal vein; discal transverse vein oblique, nearly straight, parted by less than half its length from the border, and by more than its length from the præbrachial transverse; halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings $7\frac{1}{2}$ lines.

Gen. *ARAGARA*, n. g.

Fem. *Corpus* angustum. *Caput* supra planum, thorace latius; facies valde retracta. *Antennæ* brevissimæ; articulus 3^{us} subrotundus; arista nuda. *Thorax* longus, subcompressus. *Abdomen* ovatum, thorace brevius. *Pedes* antici raptorii, coxis longissimis, femoribus incrassatis. *Alæ* sat angustæ.

Allied to *Dacus*.

Female. Body narrow. Head flat above, broader than the thorax; face much retracted. Antennæ very short; 3rd joint nearly round, a little longer than the 2nd; arista bare, slender. Thorax long, slightly compressed. Abdomen oval, shorter but hardly broader than the thorax. Fore legs raptorious; coxæ very long; femora incrassated; tibiae shorter than the femora to which they are applied. Posterior legs moderately long and stout. Wings rather narrow.

188. *ARAGARA CRASSIPES*, n. s. *Fem.* Cinereo-nigra, capite cyaneo, tarsis testaceis, alis cinereis, halteribus albis.

Female. Black, slightly covered with cinereous tomentum; head blue, shining, luteous on each side in front; antennæ black; thorax cinereous on each side; tarsi testaceous, with black tips; wings grey; veins black; præbrachial vein and subanal vein very near each other from the base to the discal transverse vein, which is straight and parted

by four times its length from the border, and by more than four times its length from the præbrachial transversæ; halteres white. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. ENICOPTERA, *Macq.*

189. ENICOPTERA PICTIPENNIS, n. s. *Mas.* Fulva, longa, nitens, pubescens, capite luteo vitta lata, litura antica arcuata maculique duabus lateralibus nigris, palpis nigro notatis, antennis basi nigro guttatis apice nigricantibus, abdomine longi-fusiformi nigricante basi fulvo, alis longis luteis apud costam nigris postice cinereis, vittis quatuor deviis fuscis.

Male. Tawny, long, shining, pubescent, testaceous beneath; head pale luteous, with a broad black stripe, which is dilated on each side; a black U-shaped mark about the face, which is black; a large black spot on each side of the peristoma; palpi partly black; antennæ blackish at the tips, and with a black dot on each at the base; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista plumose; pectus with a minute blackish mark on each side in front; abdomen blackish, except towards the base, elongate-fusiform, much longer and narrower than the thorax; legs long, testaceous, minutely pubescent; wings long, luteous, cinereous along the inner part of the hind border; black along the exterior part of the costa, and with four irregular brown stripes which are abbreviated towards the base, the first also interrupted; veins luteous, black in the dark parts; radial vein undulating; cubital vein hardly undulating; præbrachial vein curved and inclined forward towards its tip; discal transverse vein very oblique, slightly curved outwards, parted by less than half its length from the border, and by more than its length from the præbrachial transversæ. Length of the body 7 lines; of the wings 16 lines.

190. ENICOPTERA TORTUOSA, n. s. *Mas.* Fulva, longa, nitens, pubescens, facie argenteo bistrigata, thoracis vittis duabus fasciæque metathoracæ pectorisque disco nigris, abdomine lineari vittis duabus ventralibus nigris, alis longis vitreis subdilatis, vitta costali fulva nigricante nebulosa, apice furcata, vittis duabus obliquis flavo-fuscis.

Male. Tawny, long, shining, minutely pubescent; head depressed above, with a silvery streak on each side of the face; antennæ reaching the epistoma; 3rd joint linear, slightly and obliquely truncated at the tip, full four times the length of the 2nd; arista plumose; thorax with an irregular black stripe along each side, and with a black band adjoining the scutellum; metathorax and disc of the pectus black; abdomen linear, much longer and narrower than the thorax, with a black stripe beneath; legs long, minutely pubescent; wings long, vitreous, somewhat dilated, tawny and partly shaded with blackish along the costa; this costal stripe dilated towards the base, and emitting a fork towards the tip; two oblique brown and yellow stripes,

which part from the hind border, are united on the præbrachial transverse vein, and there join the costal stripe, the exterior one very short; veins black; radial vein excessively contorted towards its tip; cubital vein straight till near its tip, where it is inclined hindward, and is slightly undulating; præbrachial vein very undulating exteriorly; subanal vein straight; discal transverse vein very oblique, nearly straight, parted by full one-fourth of its length from the border, and by full half its length from the præbrachial transverse, which is straight, upright, and unusually long. Length of the body 7 lines; of the wings 16 lines,

Enicoptera flava, Macq. (Dipt. Exot. Suppl. 3, 63), the type of this genus, inhabits Java, and is closely allied to *E. tortuosa*, and may be a local variety of the latter species, but differs from the character and figure. Macquart states that his description was taken from an apparently immature specimen.

191. ENICOPTERA ARCUOSA, n. s. *Mas.* Fulva, longa, nitens, pubescens, capite pallide luteo vitta lata biramosa fasciæque antica nigris, thoracis lineolis duabus maculisque duabus anterioribus pectorisque lituris duabus nigris, abdomine fusiformi, alis longis lutescentibus sat angustis apices versus fuscis postice cinereis, vitta discali albida, fascia exteriore alba antice furcata et arcuata.

Male. Tawny, long, shining, minutely pubescent; head pale luteous, with a broad black stripe which emits an oblique branch on each side to the eye, and with a black band by the epistoma; antennæ nearly reaching the epistoma; 3rd joint linear, rounded at the tip, thrice the length of the 2nd; arista plumose; thorax with two short black lines, each with a black spot in front; pectus with a black mark on each side; abdomen fusiform, longer but hardly narrower than the thorax; legs long, hardly pubescent; wings long, rather narrow, somewhat luteous, brown towards the tips, grey along the hind border, with a short whitish discal stripe which terminates in a white band, the latter abbreviated hindward and forked in front, the exterior fork much curved and terminating behind the tip of the wing; veins tawny, black towards the tips; radial vein slightly undulating opposite the præbrachial transverse vein; the other veins straight; discal transverse vein slightly oblique, slightly curved outward, parted by full one-third of its length from the border, and by nearly twice its length from the præbrachial transverse; halteres testaceous. Length of the body 6 lines; of the wings 14 lines.

192. ENICOPTERA? FLAGIFERA, n. s. *Fem.* Testacea, longiuscula, frontis puncto nigro, facie nigricante-cinerea, palpis nigro guttatis, antennis luteis, thoracis lineis tribus strigisque duabus exterioribus, metathorace pectorisque lituris nigris, abdomine fusiformi fasciis duabus basalibus nigris; alis vitreis longiusculis, strigis duabus basalibus fasciis duabus plagaque subapicali fuscis.

Female. Testaceous, rather long, not shining, with a few black bristles;

head a little narrower than the thorax, with a black point on the front; face blackish grey; palpi with a black dot on each outer side; antennæ pale luteous, not reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista bare; thorax with three black lines and with two short and more exterior black streaks; metathorax black, shining; pectus with some black marks on each side; abdomen fusiform, hardly longer than the thorax, with two black bands near the base; legs moderately long; wings vitreous, rather long, with two narrow brown bands, the interior band emitting two brown streaks to the base of the wing, the exterior band curved, continued along the costa to the tip of the radial vein, the space beyond it mostly occupied by an elliptical brown patch; veins black, straight; discal transverse vein straight, upright, parted by more than half its length from the border, and by nearly twice its length from the oblique præbrachial transverse. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

Gen. ORTALIS, *Fallen*.

The two following species belong to a new group of *Ortalis*, and will probably form a distinct genus.

193. ORTALIS DECATOMOIDES, n. s. *Mas*. Obscure rufa, thorace brevi, abdomine nigro, fusiformi, basi rufo, pedibus fulvis, femoribus posterioribus basi albidis, tibiis posticis nigris, alis subcinereis, macula apicali fascisque duabus nigricantibus.

Male. Dull red; head rather large, a little broader than the thorax, blackish on each side of the face; antennæ wanting; thorax short; abdomen black, shining, fusiform, red at the base, a little narrower but hardly longer than the thorax; legs tawny; posterior femora whitish at the base; hind tibiæ black; wings slightly greyish, rather convex along the hind border, blackish at the tips, and with two blackish bands; first band rather oblique; veins black; præbrachial vein and cubital vein slightly curved and approximating towards the tip of the wing; discal transverse vein straight, upright, short, parted by much more than its length from the border, and by full twice its length from the præbrachial transverse, which is extremely short; Length of the body $1\frac{1}{2}$ line; of the wings $2\frac{1}{2}$ lines.

194. ORTALIS VACILLANS, n. s. *Fæm*. Fulva, arista pubescente, abdomine nigro postice lanceolato, alis limpidis, costa striga basali fascisque tribus nigricantibus.

Closely allied to *D. decatomoides*. *Female*. Tawny, shining; head full as broad as the thorax; epistoma slightly prominent; antennæ nearly reaching the epistoma; 3rd joint linear, conical towards the tip, about four times the length of the 2nd; arista pubescent; abdomen black, a little longer than the thorax, lanceolate hindward; wings limpid, blackish along the costa, with a blackish streak, and with three slen-

der blackish bands; 1st band short, oblique, abbreviated hindward by the end of the basal streak; 2nd curved, alightly abbreviated hindward; 3rd nearly straight, entire; discal transverse vein upright, nearly straight, parted by less than half its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

Gen. *TRYPETA*, *Meigen*.

195. *TRYPETA BASIFASCIA*. *Fem.* Ferruginea, longiuscula, capite antennisque luteis, arista plumosa, metathorace nigro, pectoris disco nigricante, abdomine nigro basi fulvo, pedibus halteribusque fulvis, femoribus posterioribus nigricantibus, alis nigris albo notatis basi vitreis.

Female. Ferruginous, shining, rather long; head luteous, white about the eyes, narrower than the thorax; face rather long; sides of the peristoma slightly dilated; antennæ luteous, very short, not extending to half the length of the face; 3rd joint conical, much longer than the 2nd; arista plumose; metathorax black; disk of the pectus blackish; abdomen black, fusiform, tawny towards the base, a little longer than the thorax; legs and halteres tawny; posterior femora blackish; wings black, mostly vitreous towards the base, with two white spots on the costa, with two on the hind border, and with four or five transverse white dots on the disk; veins black, tawny at the base; discal transverse vein straight, upright, parted by much less than its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 4 lines; of the wings 7 lines.

196. *TRYPETA NIGRIFASCIA*, n. s. *Mas.* Fulva, capite antennisque pallide luteis, arista plumosa, thoracis lineis duabus et fascia metathoraceque nigris, abdomine elliptico, alis vitreis latiusculis, vitta costali fulva vittaque postica fusca.

Male. Tawny, shining; head pale luteous, whitish on the face and about the eyes; antennæ pale luteous, not near reaching the epistoma; 3rd joint elongate-conical, about twice the length of the 2nd; arista plumose; thorax with an irregular black line on each side, and with a black band in front of the scutellum; metathorax black; abdomen elliptical, much shorter and a little narrower than the thorax; wings vitreous, rather broad, with a broad tawny stripe, which occupies the whole base and extends beyond the tip along the costa, where it contains some grey marks; a brown stripe near the hind border, abruptly angular exteriorly; veins tawny; discal transverse nearly straight and upright, parted by less than half its length from the border, and by more than its length from the præbrachial transverse. Length of the body 3 lines; of the wings 6 lines.

197. *TRYPETA LATIVENTRIS*, n. s. *Mas.* Fusca, lata, depressa, cavite, antennis, scutello abdomineque rufescentibus, arista subpubes-

cente, abdomine vitta interrupta nigra, pedibus testaceis, femoribus nigricantibus postice cinereis, lituris costalibus et marginalibus vitreis.

Male. Brown, rather broad and flat; head reddish, a little narrower than the thorax, testaceous on the face and about the eyes; face quite flat; antennæ reddish, not near reaching the epistoma; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista minutely pubescent; thorax with black bristles on each side; scutellum and abdomen dark reddish, the latter broader and not longer than the thorax, with a black stripe which is interrupted on the hind border of each segment; legs testaceous; femora blackish, testaceous towards the tips; wings blackish, rather broad, cinereous along the basal part of the hind border, with two small vitreous marks towards the tip of the costa, and with three vitreous marks hindward, the middle one much larger than the other two; veins black; discal transverse vein nearly straight and upright, parted by a little less than half its length from the border, and by a little less than its length from the præbrachial transverse; alulæ and halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 5 lines.

198. *TRYPETA STELLIPENNIS*, n. s. *Mas et Fam.* Ferruginea, capite antennisque pallide luteis, arista plumosa, metathorace nigricante, abdomine fusiformi, pedibus halteribusque testaceis, alis nigricantibus latiusculis, guttis marginalibus punctisque discalibus albis.

Male and Female. Ferruginous, paler beneath; head pale luteous, not so broad as the thorax; epistoma not prominent; antennæ pale luteous, not near reaching the epistoma; 3rd joint linear, rounded at the tip, full twice the length of the 2nd; arista plumose; metathorax blackish; abdomen fusiform, narrower and a little longer than the thorax; oviduct of the female cylindric-lanceolate; legs and halteres testaceous; wings blackish, rather broad, white at the tips, with white marginal dots and with white discal points; veins black; discal transverse vein upright, nearly straight, parted by a little more than one-fourth of its length from the border, and by about its length from the præbrachial transverse, which is rather long. Length of the body $2\frac{1}{2}$ – $3\frac{1}{2}$ lines; of the wings 5–6 lines.

199. *TRYPETA AMPLIFENNIS*, n. s. *Fam.* Cinerea, capite antennis pedibus halteribusque fulvis, arista nuda, abdomine nigro fusiformi basi fulvo apicem versus lanceolato, alis nigris latissimis albo guttatis.

Female. Cinereous, dull; head tawny, whitish about the eyes; face flat; antennæ tawny, very short, not extending beyond half the length of the face; 3rd joint conical, a little longer than the 2nd; arista bare; abdomen fusiform, black, shining, tawny towards the base, lanceolate towards the tip, a little narrower and much longer than the thorax; legs and halteres tawny; wings black, very broad, with a white apical spot, with some white marginal and discal dots, and with two larger white transverse costal marks; veins black, tawny at the

base; discal transverse vein straight, upright, parted by about half its length from the border, and by a little less than its length from the præbrachial transverse. Length of the body 3 lines; of the wings 6 lines.

200. *TRYPETA APPROXIMANS*, n. s. *Fam.* *Nigra*, nitens, capite rufescente, facie cinerea, abdomine elliptico apicem versus lanceolato, pedibus fulvis, femoribus nigris, alis nigricantibus albo maculatis.

Female. Black, shining; head reddish; face cinereous; abdomen elliptical, lanceolate towards the tip, much longer than the thorax; legs tawny; femora black; wings blackish, with two white triangular spots on the costa, with three white dots on the disk, with three white streaks on the hind border, and with two white subapical streaks; veins black; discal transverse vein nearly straight and upright, parted by much less than its length from the border, and by a little less than its length from the præbrachial transverse. Length of the body $1\frac{1}{2}$ line; of the wings $2\frac{1}{2}$ lines.

Gen. *SOPHIRA*, *Walk.*

201. *SOPHIRA BISTRIGA*, n. s. *Fam.* *Fulva*, capite luteo, arista plumosa, thorace pectoreque nigro maculatis, metathorace vittis duabus nigris, abdomine fusiformi maculis lateralibus nigris, oviductu lanceolato, alis nigricantibus albo bifasciatis basi fulvis.

Female. Tawny, shining; head luteous, hardly as broad as the thorax, white about the eyes; antennæ tawny, not near reaching the epistoma; 3rd joint elongate-conical, more than twice the length of the 2nd; arista plumose; thorax with four large black spots; metathorax with two black stripes; pectus with two elongated black spots on each side; abdomen fusiform, with a long lanceolate flat oviduct, much longer than the thorax; each segment with two large lateral black spots; wings blackish, tawny towards the base, with two white bands, the exterior band curved outward in front, and not extending to the costa; veins black, tawny towards the base; discal transverse vein curved outward, parted by full one-fourth of its length from the border, and by very much more than its length from the præbrachial transverse. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Gen. *PALLOPTERA*, *Fallen.*

202. *PALLOPTERA DETRACTA*, n. s. *Mas.* Testacea, capite apud oculos cinereo, arista subpubescente, abdomine guttis duabus lateralibus subapicalibus nigris, alis cinereis.

Male. Testaceous; head pale cinereous behind and about the eyes; antennæ short, tawny; arista very minutely pubescent; abdomen oval, not longer than the thorax, with a black dot on each side of the subapical segment; wings grey; veins black, testaceous at the base;

discal transverse vein straight, upright, parted by hardly half its length from the præbrachial transverse. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Subfam. DIOPSIDES, *Walk.*

Gen. DIOPSIS, *Linn.*

203. *Diopsis subnotata*, *Westw. Orient. Ent.* pl. 18. f. 2.

Inhabits also the Philippine Islands.

204. *DIOPSIS DETRAHENS*, n. s. *Fæm.* Nigra, capite ex parte ferrugineo, oculorum petiolis breviusculis, abdomine subtus lurido, coxis femoribusque fulvis, his apice nigris, alis nigricantibus macula subcostali alba.

Female. Black; head partly ferruginous; petioles of the eyes each equal in length to the space between them; abdomen lurid beneath; coxæ and femora tawny, the latter with black tips; wings blackish, with a white subcostal spot towards the tip; veins black; halteres piceous. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Subfam. SEPSIDES, *Walk.*

Gen. CALOBATA, *Fabr.*

205. *CALOBATA RESOLUTA*, n. s. *Mas.* Nigra, abdomine lineari longo, segmentis albido marginatis, pedibus longissimis, femoribus posterioribus testaceo trifasciatis, femoribus anticis basi coxisque anticis testaceis, tarsis anticis albis, alis cinereis apices versus obscurioribus fascia subapicali albida.

Male. Black, slightly shining; pectus with an oblique cinereous band on each side; abdomen linear, pale beneath, much narrower than the thorax, and nearly twice its length, hind borders of the segments whitish; legs black, very long; posterior femora with three testaceous bands; fore femora at the base, and fore coxæ, testaceous; fore tarsi white; wings dark grey, blackish grey on each side of a whitish subapical band; veins black: discal transverse vein straight, upright, parted by about half its length from the border, and by more than four times its length from the præbrachial transverse; halteres piceous. Length of the body 6 lines; of the wings 10 lines.

206. *CALOBATA IMPINGENS*, n. s. *Mas et Fæm.* Obscure cyanea, antennis rufis, abdomine subtus ferrugineo segmentis albo marginatis, pedibus fulvis, femoribus tibiisque anticis nigris, illis basi fulvis, femoribus posterioribus nigro trifasciatis, tibiis tarsisque posterioribus obscure fulvis, tarsis anticis albis basi nigris, alis cinereis fusco bifasciatis.

Male and Female. Dark blue; head white about the eyes; antennæ red; abdomen lanceolate, ferruginous beneath, narrower and very

much longer than the thorax, hind borders of the segments white; legs tawny, very long; posterior coxæ and fore tibiæ black; posterior femora with three black bands; fore femora black, tawny towards the base; posterior tibiæ and posterior tarsi dark tawny; fore tarsi white, black at the base; wings grey, with two brown bands, the second apical; veins black; cubital vein and præbrachial vein converging to the tip of the wing; discal transverse vein straight, upright, parted by much less than its length from the border, and by more than thrice its length from the præbrachial transverse. *Var. β*: Bands of the wings broader and more complete. Length of the body 4-5 lines; of the wings 7-8 lines.

This species is erroneously recorded as *C. indica* in Vol. III. p. 124.

207. *CALOBATA BIFASCIATA*, n. s. *Fem.* Nigra, longissima, gracillima, capite litura transversa albida, arista breviuscula basi robusta, abdominis dimidio antico subclavato fasciis duabus cinereis, dimidio postico lanceolato, femoribus posticis basi albidis apice rufescentibus, tarsis anticis albis apice nigris, alis cinereis nigricante bifasciatis.

Female. Black, very long and slender; head with a whitish transverse mark in front of the face, which is very short; 3rd joint of the antennæ elongate-conical, more than twice the length of the 2nd; arista rather short, stout towards the base; thorax attenuated in front; abdomen more than twice the length of the thorax, broadest in the middle, subclavate to half its length, lanceolate from thence to the tip, two cinereous bands on the basal half; legs long; hind femora whitish at the base, reddish at the tips; fore tarsi white, with black tips; wings grey, slightly blackish at the tips, and with two blackish bands, the second broader and more complete than the first; veins black; cubital vein and præbrachial vein slightly converging towards the tip of the wing; discal transverse vein straight, oblique, parted by less than its length from the border, and by more than thrice its length from the præbrachial transverse. Length of the body 5 lines; of the wings 8 lines.

Gen. *CARDIACEPHALA*, *Macq.*

208. *CARDIACEPHALA VARIPES*, n. s. *Mas.* Testacea, gracillima, capite subelongato, antennis pallide rufis basi nigris, thorace antico attenuato, abdomine lineari apicem versus tumido, femoribus intermediis subincrassatis, tibiis intermediis nigris, tarsis intermediis albis apice nigris, alis pallide fuscescentibus, basi fasciæque cinerascensibus.

Male. Testaceous, very slender; head somewhat elongated; antennæ pale red, black at the base; thorax long, attenuated in front; abdomen linear, tumid towards the tip, narrower and much longer than the thorax; legs very long; fore legs much shorter and more slender than the others; middle femora slightly incrassated, except towards the tips; middle tibiæ black; middle tarsi white, with black tips; wings

pale brownish, greyish towards the base and with a greyish band beyond the discal transverse vein; veins black, testaceous towards the base; cubital vein and præbrachial vein slightly converging towards the tip of the wing; discal transverse vein straight, upright, parted by less than its length from the border, and by about thrice its length from the præbrachial transverse. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Gen. SEPSIS, *Fullen.*

209. SEPSIS TESTACEA, n. s. *Mas et Fæm.* Testacea aut fulva, antennis pallide rufis, abdomine subpubescente, alis cinerascens, costa basali nigra. *Var. β.* Abdomine piceo basi fulvo.

Male and Female. Testaceous or tawny, slightly setose; antennæ pale red, 3rd joint conical, about twice the length of the 2nd; abdomen alightly pubescent; wings greyish, black along the costa towards the base; veins black; discal transverse vein straight, upright, parted by a little more than its length from the border, and by more than its length from the præbrachial transverse. *Var. β:* Abdomen piceous, tawny towards the base. Length of the body 2-3 lines; of the wings 3-4 lines.

210. SEPSIS FRONTALIS, n. s. *Mas.* Nigra, capite antico, antennis, pedibus anticis femoribusque posterioribus basi testaceis, alis vitreis. *Fæm.* Fulva, abdomine nigro.

Male. Black, shining; head in front and antennæ testaceous; fore legs testaceous; posterior femora testaceous towards the base; wings vitreous; veins black; discal transverse vein straight, oblique, parted by twice its length from the border, and from the præbrachial transverse. *Female.* Tawny; abdomen black. Length of the body 1 line; of the wings 2 lines.

211. SEPSIS FASCIPES, n. s. *Fæm.* Nigra, subnitens, antennis pallide rufis, abdomine fusiformi postice attenuato, pedibus albis, tibiis intermediis femoribusque nigris, tibiis posticis basi apiceque nigris, alis cinereis macula apicali nigra.

Female. Black, slightly shining; antennæ pale red, very short, 3rd joint conical; abdomen fusiform, lanceolate and much attenuated towards the tip, much longer than the thorax; legs white; femora and middle tibiæ black; hind tibiæ black at the base and at the tips; wings grey, with a black spot at the tip of the costa; veins black; discal transverse vein straight, upright, parted by its length from the border, and by full twice its length from the præbrachial transverse. Length of the body $\frac{1}{2}$ line; of the wings 3 lines.

212. SEPSIS REVOCANS, n. s. *Fæm.* Cupreo-nigra, antennis nigris, pedibus halteribusque testaceis, alis subcinerascens basi nigris cantibus.

Female. Cupreous-black, shining; antennæ black, very short;

testaceous; wings slightly greyish, blackish at the base of the costa; veins black; discal transverse vein straight, upright, parted by more than twice its length from the border, and by less than twice its length from the præbrachial transverse; halteres testaceous. Length of the body $1\frac{1}{2}$ line; of the wings 2 lines.

Subfam. PSILIDES, *Walk.*

Gen. MICROPEZA, *Macq.*

213. *Micropeza fragilis*, *Walk.* See Vol. I. p. 37.

Gen. CÆNURGIA, n. g.

Mas. *Corpus* gracile. *Caput* elongatum, antice conicum. *Antennæ* porrectæ; articulus 3^{us} lanceolatus; arista apicalis, sat robusta. *Thorax* linearis. *Abdomen* fusiforme, thorace vix angustius, non longius. *Pedes* longi; femora lata, compressa; tarsi antici articulo 1^o dilatato fusiformi. *Alæ* breviusculæ, sat angustæ.

Allied to *Nerius*. *Male*. Body slender. Head elongate, conical in front, as broad as the thorax. *Antennæ* porrect; 1st and 2nd joints short; 3rd lanceolate; arista rather stout, apical, larger than all the preceding joints. *Thorax* linear. *Abdomen* fusiform, hardly narrower and not longer than the thorax. *Legs* long, femora broad, compressed; fore tarsi with the first joint dilated, fusiform. *Wings* rather short and narrow.

214. CÆNURGIA REMIPES, n. s. *Mas.* *Fulva*, capite guttis tribus nigris, antennis basi nigris, arista alba, thorace maculis duabus nigris, pedibus nigris, coxis femoribusque luteis apice nigris, alis flavo-cinereis, halteribus apice nigris.

Male. Tawny; head with a black spot on the vertex, and with two black dots on each side, one in front, the other behind; *antennæ* black towards the base; arista white; thorax with a black spot on each side in front; legs black; coxæ and femora luteous, with black tips; wings grey, tinged with yellow; veins black; cubital vein and præbrachial vein converging towards the tip of the wing; discal transverse vein straight, oblique, parted by less than its length from the border, and by more than twice its length from the præbrachial transverse; halteres with black knobs. Length of the body $3\frac{1}{2}$ lines; of the wings $5\frac{1}{2}$ lines.

Gen. NERIUS, *Wied.*

215. *Nerius fuscipennis*, *Macq.* See Vol. I. p. 38.

Gen. SERACA, n. g.

Fem. *Corpus* longiusculum. *Caput* transversum, thorace vix angustius. *Antennæ* breves, articulo 3^o conico, arista plumosa. *Thorax* ellip-

ticus. *Abdomen* ellipticum. *Pedes* mediocres. *Alæ* longiusculæ, latiusculæ.

Female. Body rather long. Head transverse, nearly as broad as the thorax; epistoma not prominent. Antennæ short, not near reaching the epistoma; 3rd joint conical, much longer than the 2nd; arista plumose. Thorax and abdomen elliptical, about equal in length. Legs moderately long and slender. Wings rather long and broad.

216. *SERACA SIGNIFERA*, n. s. *Fem.* Fulva, thorace vittis quatuor metathorace vittis duabus abdomine maculis lateralibus nigris, alis obscure fuscis albo quinquesignatis apud costam nigricantibus basi flavis.

Female. Tawny, shining; head testaceous about the eyes; thorax with four black stripes, the outer pair incomplete; metathorax with two black stripes; abdomen with a row of black spots along each side; wings dark brown, blackish along the costa, yellow at the base, with five lanceolate white marks, two of these resting on the costa, the third between them near the hind border, the fourth exterior, discal, slender, oblique, the fifth on the hind border near the tip; veins black, tawny at the base; discal transverse vein curved outward, parted by about one-fourth of its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 4 lines; of the wings 8 lines.

217. *SERACA SIGNATA*, n. s. *Fem.* Testacea, longiuscula, epistomate guttis duabus nigris, arista plumosa, abdomine postice attenuato maculis duabus lateralibus subapicalibus, alis cinerascensibus, costa exteriore nigricante.

Female. Testaceous, shining, rather long; head nearly as broad as the thorax, with a black dot on each side of the epistoma; antennæ short, 3rd joint elongate-conical, arista plumose; thorax elliptical; abdomen attenuated hindward, longer than the thorax, with a black spot on each side of the 5th segment; wings greyish, blackish along the apical half of the costa; veins testaceous, black towards the tips; discal transverse vein nearly straight and upright, parted by about one-fourth of its length from the border, and by hardly more than its length from the præbrachial transverse. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Gen. *PSILA*, *Meigen*.

218. *PSILA BIPUNCTIFERA*, n. s. *Fem.* Testacea, facie nigro bipunctata, antennarum articulo 3^o longiconico, arista pubescente, abdomine guttis duabus apicalibus nigris, alis pallide cinereis flavo suffusis.

Female. Testaceous; head somewhat pilose beneath, with a black point on each side of the face; 3rd joint of the antennæ elongate-conical, about twice the length of the 2nd; arista pubescent; thorax elongate, somewhat flat above; abdomen fusiform, a little longer than the thorax;

5th segment with a black dot on each side; wings pale cinereous, tinged with yellow; veins yellow; discal transverse vein straight, oblique, parted by hardly more than one-fourth of its length from the border, and by more than its length from the præbrachial transverse. Length of the body 5 lines; of the wings 10 lines.

219. *PSILA MUNDA*, n. s. *Mas et Fem.* Nigra, nitens, facie testacea nigro notata, antennis testaceis basi nigris, arista plumosa, thorace subcinerascente, scutello obscure testaceo, pedibus testaceis, alis cinereis apud costam nigriscentibus, halteribus albidis.

Male and Female. Black, shining; head testaceous, blackish above; disk of the face black, shining; antennæ short, testaceous, black at the base; 3rd joint linear, rounded at the tip, about twice the length of the 2nd; arista plumose: thorax linear, with slight cinereous tomentum; scutellum dull testaceous; abdomen fusiform, a little longer than the thorax; legs testaceous; wings grey, blackish along the costa towards the tips; veins black; discal transverse vein straight, upright, parted by about half its length from the border, and by nearly thrice its length from the præbrachial transverse; halteres whitish. Length of the body $2\frac{1}{2}$ –3 lines; of the wings 4–5 lines.

Gen. *TEXARA*, Walk.

220. *TEXARA DIOCTRIOIDES*, n. s. *Mas et Fem.* Nigra, longa, gracilis, capite nigro-cyaneo, thorace vittis quatuor cinereis, segmentorum abdominalium lateribus albo marginatis, pedibus fulvo fasciatis, alis cinereis, halteribus testaceis.

Male and Female. Black, long, slender; head bluish-black, white about the eyes in front; antennæ of the male piceous, of the female tawny, 3rd joint round, arista minutely pubescent; thorax with four cinereous stripes; abdomen about twice the length of the thorax, cylindrical towards the base, subclavate in the male and elongate-fusiform in the female hindward: hind borders of the segments white on each side; fore femora, hind tibiæ and hind tarsi tawny at the base; middle legs and hind femora tawny, the latter with a broad black band; fore tibiæ white, black at the base; wings grey; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by almost four times its length from the præbrachial transverse; halteres testaceous. Length of the body 4–4½ lines; of the wings 6–7 lines.

Gen. *GOBBYA*, n. g.

Mas. *Corpus* gracillimum. *Caput* thorace multo latius; frons sat angusta; facies plana. *Oculi* magni. *Antennæ* brevissimæ; articulus 3^{us} conicus; arista pubescens. *Thorax* sat parvus. *Abdomen* cylindricum, gracillimum, apice clavatum, thorace duplo longius. *Pedes* graciles; anteriores breves; postici longiusculi. *Alæ* perangustæ.

Male. Body very slender. Head much broader than the thorax; front rather narrow; face vertical, flat; eyes large, prominent. Antennæ very short; 3rd joint conical, longer than the 2nd; arista pubescent. Thorax rather small. Abdomen clavate, about twice the length of the thorax, cylindrical and very slender till near its tip. Legs slender; anterior legs short; hind legs rather long. Wings very narrow; discal transverse vein straight, upright, parted by more than its length from the border, and by more than four times its length from the præbrachial transverse.

221. *GOBRYA BACCHOIDES*, n. s. *Mas.* Cyanea, nitens, antennis pedibusque pallide flavis, abdomine nigro fasciis duabus flavis, femoribus posterioribus tibiisque posticis nigris, tarsis posticis basi nigris, alis vix cinerascens, halteribus flavis apice nigris.

Male. Blue, shining; proboscis, antennæ, and legs pale yellow; abdomen black, with two pale yellow bands, the hind one very slender; posterior femora and hind tibiæ black, the former pale yellow at both ends; middle tibiæ and tarsi wanting; hind tarsi black towards the base; wings hardly greyish, apical third part brown; veins black; halteres pale yellow, with black knobs. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Subfam. OSCINIDES, *Haliday*.

Gen. OSCINIS, *Fabr.*

222. *OSCINIS FEMORATA*, n. s. *Mas.* Atra, nitens, capite nigro-cyaneo, femoribus anterioribus basi, tibiis anterioribus apice, tarsis halteribusque flavis, femoribus posticis incrassatis, alis cinerascens.

Male. Deep black, shining; head bluish-black; abdomen conical, shorter than the thorax; legs black; anterior femora at the base, anterior tibiæ at the tips, and tarsi yellow; hind femora incrassated; wings greyish; veins black; discal transverse vein straight, upright, parted by more than its length from the border, and by much more than its length from the præbrachial transverse; halteres yellow. Length of the body $1\frac{1}{2}$ line; of the wings 2 lines.

Gen. PIOPHILA, *Fallen*.

223. *PIOPHILA CONECTA*, n. s. *Fem.* Nigra, nitens, oviductu lanceolato, pedibus halteribusque fulvis, pedibus anticis nigris, femoribus basi fulvis, alis cinereis.

Female. Black, shining; oviduct prominent, lanceolate; legs and halteres tawny; fore legs black; coxæ, femora at the base and knees tawny; wings grey; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by more than its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

Gen. *OPOMYZA*, *Fallen*.

224. *OPOMYZA NIGRIFINIS*, n. s. *Fam.* Cinerea, capite antennisque pallide rufis, arista plumosa, thorace bilineato, pectore halteribusque albis, abdomine fulvo lanceolato apicem versus nigro, pedibus fulvis, alis nigris albo guttatis.

Female. Cinereous; head pale red, white beneath; antennæ pale red, very short, 3rd joint nearly round, arista plumose; thorax with two indistinct darker lines; pectus and halteres white; abdomen lanceolate, tawny, shining, black towards the tip; legs tawny; wings black, rather narrow, with about ten white dots, of which two are larger than the others, and form a broken and almost interrupted band near the base; veins black; discal transverse vein straight, upright, parted by about half its length from the border; no præbrachial transverse vein. Length of the body $1\frac{1}{4}$ – $1\frac{1}{2}$ lines; of the wings $2\frac{1}{4}$ –3 lines.

Gen. *DROSOPHILA*, *Fallen*.

225. *DROSOPHILA SOLENNIS*, n. s. *Mas.* Testacea, facie carinata, thorace vittis quatuor fulvis, abdomine fasciis abbreviatis nigricantibus, alis cinereis.

Male. Testaceous; face keeled; antennæ wanting; thorax with four tawny stripes; abdomen elliptical, a little longer than the thorax, with blackish abbreviated bands; wings grey; veins black; discal transverse vein straight, upright, parted by hardly less than its length from the border, and by about thrice its length from the præbrachial transverse. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

226. *DROSOPHILA RUDIS*, n. s. *Mas.* Fulva, facie albida, abdomine nigro nitente basi fulvo, pedibus halteribusque testaceis, alis cinereis apud costam obscurioribus maculis quatuor nigricantibus.

Male. Tawny, testaceous beneath; face whitish; antennæ wanting; abdomen elongate-oval, black, shining, tawny at the base, not longer than the thorax; legs and halteres testaceous; wings grey, darker along the costa, with four blackish spots, first spot subcostal, larger than the second which is discal, third apical, band between the second and third spots irregular, attenuated hindward; veins black; discal transverse vein straight, upright, parted by nearly its length from the border, and by nearly twice its length from the præbrachial transverse. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

227. *DROSOPHILA ILLATA*, n. s. *Fem.* Fulva, segmentorum abdominalium marginibus pedibusque testaceis, alis cinereis.

Female. Tawny; antennæ very short, 3rd joint conical, arista thinly plumose; abdomen oval, not longer than the thorax, hind borders of the segments and legs testaceous; wings grey; veins black, tawny at the base; discal transverse vein straight, upright, parted by about its length from the border, and by nearly four times its length from the præbrachial transverse. Length of the body $1\frac{1}{2}$ line; of the wings $2\frac{1}{2}$ lines.

228. *DROSOPHILA LURIDA*, n. s. *Mas.* Atræ, capite piceo, arista plumosa, abdomine lurido subpubescente, pedibus obscure fulvis, alis lurido-cinereis, punctis marginalibus nigris, vena transversa præbrachiali nigro nebulosa.

Male. Deep black; head piceous; antennæ short, 3rd joint elongate-conical, arista thinly plumose; pectus piceous; abdomen oval, lurid red, minutely pubescent, not longer than the thorax; legs dull tawny; wings lurid grey, blackish at the base, with black points at the tips of the longitudinal veins; veins yellowish; discal transverse vein straight, upright, with a black point at each end, parted by less than its length from the border, and by about twice its length from the præbrachial transverse, which is clouded with black. Length of the body 2 lines; of the wings 4 lines.

229. *DROSOPHILA LATERALIS*, n. s. *Mas.* Fulva, subtus testacea, abdomine maculis lateralibus nigris, pedibus halteribusque testaceis, alis cinereis.

Male. Tawny, testaceous beneath; antennæ short, 3rd joint conical, arista plumose; abdomen not longer than the thorax, with black spots along each side; legs and halteres testaceous; wings grey; veins black. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

Gen. DISCOMYZA, *Meigen*.

230. *DISCOMYZA OBSCURATA*, n. s. *Fem.* Cinereo-nigra, capite abdomineque nigris nitentibus, antennis obscure rufis, arista plumosa, pectoris lateribus albido conspersis, alis cinereis fascia informi maculaque apicali nigricantibus, halteribus albis.

Female. Cinereous black; head black, shining; antennæ short, dark red, 3rd joint conical, longer than the 2nd, arista thinly plumose; sides of the pectus with minute whitish speckles; abdomen elliptical, flat, black, shining, longer than the thorax; legs black; wings grey, with an irregular blackish band which does not extend to the hind border, and with a blackish apical spot; veins black; discal transverse vein straight, oblique, parted by much less than its length from the border, and by very much more than its length from the præbrachial transverse, which is clouded with black; halteres white. Length of the body 2 lines; of the wings 3 lines.

Gen. NOMBA, n. g.

Mas et Fem. Corpus latum, crassum. Frons lata. Antennæ brevissimæ; articulus 3^{us} subrotundus; arista subpubescens. Thorax subpubescens, quasi coriaceus; scutellum parvum; metathorax maximus, abdomen alasque incumbentes obtegens. Pedes breves, robusti; femora subincrassata; tibiæ arcuatæ. Alæ parvæ.

Male and Female. Body broad, thick, compact. Head almost as broad as the thorax; front broad, narrower than the epistoma; face verti-

Antennæ very short; third joint nearly round; arista very minutely pubescent. Thorax solid, apparently horny, very minutely pubescent; scutellum small; metathorax elliptical, enormously developed, covering the whole abdomen, sheltering the wings when in repose. Legs short, stout; femora slightly incrassated; tibiæ curved. Wings concealed beneath the metathorax.

231. *NOMBA TECTA*, n. s. *Mas et Fæm.* Nigra, obscura, antennis piceis, tarsis flavis apice nigris, alis cinereis.

Male and Female. Black, dull; antennæ piceous; tarsi yellow, with black tips; wings grey; veins black. Length of the body $1\frac{1}{2}$ – $1\frac{3}{4}$ line; of the wings $2\frac{1}{2}$ –3 lines.

Subfam. HYDROMYZIDES, *Haliday*.

Gen. NOTIPHILA, *Fallen*.

232. *NOTIPHILA LINEOSA*, n. s. *Mas et Fæm.* Fusca, obscura, capite apud oculos linea frontali et epistomate albidis, arista plumosa, thorace lineis sex albidis, abdomine nigro segmentorum marginibus fulvis, pedibus nigris, tibiis anticis genubus tarsis halteribusque fulvis, alis cinereis.

Male and Female. Brown, dull; head whitish about the eyes, and with a whitish line on the front; epistoma whitish; antennæ not near reaching the epistoma, 3rd joint elongate, arista thinly plumose; thorax with six whitish lines, the lateral pair incomplete; abdomen black, not longer than the thorax, hind borders of the segments tawny; legs black, tarsi, knees, posterior tibiæ at the tips, and fore tibiæ tawny; wings grey; veins black; discal transverse vein straight, upright, parted by more than its length from the border, and by full thrice its length from the præbrachial transverse; halteres tawny. Length of the body $1\frac{1}{2}$ –2 lines; of the wings $3\frac{1}{2}$ –4 lines.

The two following species belong to the group of which *N. Cinerea* is the type.

233. *NOTIPHILA QUADRIFASCIA*, n. s. *Fæm.* Fusca, subtus cinerea, capite antico amplo, facie convexa, antennis nigris, arista plumosa, metathorace abdominisque maculis duabus basalibus fasciisque quatuor albidis, genubus tarsisque rufescentibus, alis cinereis puncto costali nigro, halteribus testaceis.

Female. Brown, cinereous beneath; head large and somewhat tumid in front and beneath; face cinereous, convex; antennæ black, very small, 3rd joint conical, arista plumose; metathorax whitish; abdomen with a whitish spot on each side at the base, and with four whitish bands, of which the 3rd and 4th are interrupted; legs cinereous black, knees and tarsi reddish; wings grey, with a black costal point at the tip of the subcostal vein; veins black; discal transverse vein oblique, nearly straight, parted by less than half its length from the

border, and by nearly thrice its length from the præbrachial transverse; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

234. *NOTIPHILA FLAVILINEA*, n. s. *Mas et Fem.* Piceo-nigra, capite apud oculos testaceo, antennis rufescentibus, arista plumosa, abdominis segmentis flavo marginatis, alis cinereis apud costam sub-luridis, halteribus testaceis.

Male and Female. Piceous brown; head rather paler, testaceous about the eyes; antennæ reddish, very short, 3rd joint conical, arista plumose; abdomen oval, not longer than the thorax; hind borders of the segments yellow; wings grey, with a slight lurid tinge along the costa; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by a little more than twice its length from the præbrachial transverse; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. *EPHYDRA*. *Fallen.*

235. *EPHYDRA BORBOROIDES*, n. s. *Fem.* Nigra, lata, crassa, pubescens, subætosæ, antennis piceis, arista pubescente, tibiis tarsisque flavo fasciatis, alis nigricantibus latiusculis cinerascens sexguttatis.

Female. Black, broad, thick, somewhat pubescent and with a few bristles; antennæ piceous, short, 3rd joint round, arista pubescent; abdomen broader than the thorax; legs rather setose, tibiæ and tarsi with yellow bands; wings blackish, rather broad, with about six greyish dots on each; veins black; posterior longitudinal veins abbreviated; discal transverse vein parted by more than twice its length from the border, and by less than its length from the præbrachial transverse. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

236. *EPHYDRA MACULICORNIS*, n. s. *Mas.* Cinereo-nigra, capite antennisque rufis, his puncto nigro, arista nuda, abdomine nigro nitente, tarsis testaceis, alis cinereis apud costam pubescentibus.

Male. Cinereous black; head red in front and about the eyes; antennæ red, 3rd joint round with a black point above; arista short, simple; abdomen oval, black, shining, not longer than the thorax; tarsi testaceous; wings grey, minutely pubescent along the border; veins black; discal transverse vein straight, oblique, parted by more than twice its length from the border and from the præbrachial transverse; halteres piceous. Length of the body 2 lines; of the wings 4 lines.

Gen. *OCHTHERA*, *Latr.*

237. *OCHTHERA INNOTATA*, n. s. *Fem.* Cinereo-nigra, capite antice flavescenti-albo, pectore pedibusque cinereis, abdomine cyanescenti-nigro, alis cinereis, halteribus albidis.

Female. Cinereous black; head yellowish white in front, silvery white hindward; pectus and legs cinereous; abdomen bluish black;

grey; veins black; pabrachial vein forming an obtuse angle at its junction with the discal transverse vein, the latter very oblique, parted by little more than half its length from the border, and by nearly thrice its length from the præbrachial transverse; halteres whitish. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

Fam. PHORIDÆ, *Haliday*.

Gen. PHORA, *Latr.*

238. PHORA BIFASCIATA, n. s. *Fam.* Atra, subtus flavescenti-alba, antennis fulvis, abdomine lanceolato, fasciis duabus apice pedibus halteribusque flavescenti-albis, pedibus posticis nigris basi flavescenti-albis, tarsis intermediis nigricantibus, alis cinereis.

Female. Deep black, yellowish white beneath; antennæ tawny; abdomen lanceolate, much longer than the thorax; sides elevated, a broad basal yellowish white band, and a narrower one beyond the middle, tip also yellowish white; anterior legs and halteres yellowish white, middle tarsi blackish, hind femora with the basal half yellowish white; wings cinereous, veins black, pale at the base; costal vein ending at a little beyond half the length of the wing; radial cubital, præbrachial, and pabrachial veins parallel and equally distinct. Length of the body $2-2\frac{1}{2}$ lines; of the wings 5-6 lines.

On the Zoological Geography of the Malay Archipelago. By ALFRED B. WALLACE, Esq. Communicated by CHARLES DARWIN, Esq., F.R.S. & L.S.

[Read Nov. 3rd, 1859.]

IN Mr. Sclater's paper on the Geographical Distribution of Birds, read before the Linnean Society, and published in the 'Proceedings' for February 1858, he has pointed out that the western islands of the Archipelago belong to the Indian, and the eastern to the Australian region of Ornithology. My researches in these countries lead me to believe that the same division will hold good in every branch of Zoology; and the object of my present communication is to mark out the precise limits of each region, and to call attention to some inferences of great general importance as regards the study of the laws of organic distribution.

The Australian and Indian regions of Zoology are very strongly contrasted. In one the Marsupial order constitutes the great mass of the mammalia,—in the other not a solitary marsupial animal exists. Marsupials of at least two genera (*Cuscus* and *Belideus*) are found all over the Moluccas and in Celebes; but none have

been detected in the adjacent islands of Java and Borneo. Of all the varied forms of *Quadrumana*, *Carnivora*, *Insectivora* and *Ruminantia* which abound in the western half of the Archipelago, the only genera found in the Moluccas are *Paradoxurus* and *Cervus*. The *Sciuridæ*, so numerous in the western islands, are represented in Celebes by only two or three species, while not one is found further east. Birds furnish equally remarkable illustrations. The Australian region is the richest in the world in Parrots; the Asiatic is (of tropical regions) the poorest. Three entire families of the Psittacine order are peculiar to the former region, and two of them, the Cockatoos and the Lories, extend up to its extreme limits, without a solitary species passing into the Indian islands of the Archipelago. The genus *Palæornis* is, on the other hand, confined with equal strictness to the Indian region. In the Rasorial order, the *Phasianidæ* are Indian, the *Megapodiidæ* Australian; but in this case one species of each family just passes the limits into the adjacent region. The genus *Tropidorrhynchus*, highly characteristic of the Australian region, and everywhere abundant as well in the Moluccas and New Guinea as in Australia, is quite unknown in Java and Borneo. On the other hand, the entire families of *Bucconidæ*, *Trogonidæ* and *Phyllornithidæ*, and the genera *Pericrocotus*, *Picnonotus*, *Trichophorus*, *Ixos*, in fact, almost all the vast family of Thrushes and a host of other genera, cease abruptly at the eastern side of Borneo, Java, and Bali. All these groups are common birds in the great Indian islands; they abound everywhere; they are the characteristic features of the ornithology; and it is most striking to a naturalist, on passing the narrow straits of Macassar and Lombock, suddenly to miss them entirely, together with the *Quadrumana* and *Felidæ*, the *Insectivora* and *Rodentia*, whose varied species people the forests of Sumatra, Java, and Borneo.

To define exactly the limits of the two regions where they are (geographically) most intimately connected, I may mention that during a few days' stay in the island of Bali I found birds of the genera *Copsychus*, *Megalaima*, *Tiga*, *Ploceus*, and *Sturnopastor*, all characteristic of the Indian region and abundant in Malacca, Java, and Borneo; while on crossing over to Lombock, during three months collecting there, not one of them was ever seen; neither have they occurred in Celebes nor in any of the more eastern islands I have visited. Taking this in connexion with the fact of *Cacatua*, *Tropidorrhynchus*, and *Megapodius* having their western limit in Lombock, we may consider it established that the Strait of Lombock

(only 15 miles wide) marks the limits and abruptly separates two of the great Zoological regions of the globe. The Philippine Islands are in some respects of doubtful location, resembling and differing from both regions. They are deficient in the varied Mammals of Borneo, but they contain no Marsupials. The Psittaci are scarce, as in the Indian region; the Lories are altogether absent, but there is one representative of the Cockatoos. Woodpeckers, Trogons, and the genera *Ixos*, *Copsychus*, and *Ploceus* are highly characteristic of India. *Tanysiptera* and *Megapodius*, again, are Australian forms, but these seem represented by only solitary species. The islands possess also a few peculiar genera. We must on the whole place the Philippine Islands in the Indian region, but with the remark that they are deficient in some of its most striking features. They possess several isolated forms of the Australian region, but by no means sufficient to constitute a real transition thereto.

Leaving the Philippines out of the question for the present, the western and eastern islands of the Archipelago, as here divided, belong to regions more distinct and contrasted than any other of the great zoological divisions of the globe. South America and Africa, separated by the Atlantic, do not differ so widely as Asia and Australia: Asia with its abundance and variety of large Mammals and no Marsupials, and Australia with scarcely anything but Marsupials; Asia with its gorgeous *Phasianidae*, Australia with its dull-coloured *Megapodiidae*; Asia the poorest tropical region in Parrots, Australia the richest: and all these striking characteristics are almost unimpaired at the very limits of their respective districts; so that in a few hours we may experience an amount of zoological difference which only weeks or even months of travel will give us in any other part of the world!

Moreover there is nothing in the aspect or physical character of the islands to lead us to expect such a difference; their physical and geological differences do not coincide with the zoological differences. There is a striking homogeneity in the two halves of the Archipelago. The great volcanic chain runs through both parts; Borneo is the counterpart of New Guinea; the Philippines closely resemble the equally fertile and equally volcanic Moluccas; while in eastern Java begins to be felt the more arid climate of Timor and Australia. But these resemblances are accompanied by an extreme zoological diversity, the Asiatic and Australian regions finding in Borneo and New Guinea respectively their highest development.

But it may be said: "The separation between these two regions is not so absolute. There ~~is~~ some transition. There ~~are~~ species and genera common to the eastern and western islands." This is true, yet (in my opinion) proves no transition in the proper sense of the word; and the nature and amount of the resemblance only shows more strongly the absolute and original distinctness of the two divisions. The exception here clearly proves the rule.

Let us investigate these cases of supposed transition. In the western islands almost the only instance of a group peculiar to Australia and the eastern islands is the *Megapodius* in North-west Borneo. Not one of the Australian forms of Mammalia passes the limits of the region. On the other hand, *Quadrupana* occur in Celebes, Batchian, Lombock, and perhaps Timor; Deer have reached Celebes, Timor, Buru, Ceram, and Gilolo, but not New Guinea; Pigs have extended to New Guinea, probably the true eastern limit of the genus *Sus*; Squirrels are found in Celebes, Lombock, and Sumbawa: among birds, *Gallus* occurs in Celebes and Sumbawa, Woodpeckers reach Celebes, and Hornbills extend to the North-west of New Guinea. These cases of identity or resemblance in the animals of the two regions we may group into three classes; 1st, identical species; 2nd, closely allied or representative species; and 3rd, species of peculiar and isolated genera. The common Grey Monkey (*Macacus cynomolgus*) has reached Lombock, and perhaps Timor, but not Celebes. The Deer of the Moluccas seems to be a variety of the *Cervus rufus* of Java and Borneo. The Jungle Cock of Celebes and Lombock is a Javanese species. *Hirundo javanica*, *Zosterops flavus*, *Halcyon collaris*, *Eurystomus gularis*, *Macropygia phasianella*, *Merops javanicus*, *Anthreptes lepida*, *Ptilonopus melanocephala*, and some other birds appear the same in the adjacent islands of the eastern and western divisions, and some of them range over the whole Archipelago. But after reading Lyell on the various modes of dispersion of animals, and looking at the proximity of the islands, we shall feel astonished, not at such an amount of interchange of species (most of which are birds of great powers of flight), but rather that in the course of ages a much greater and almost complete fusion has not taken place. Were the Atlantic gradually to narrow till only a strait of twenty miles separated Africa from South America, can we help believing that many birds and insects and some few mammals would soon be interchanged? But such interchange would be a fortuitous mixture of faunas essentially and absolutely dissimilar, not a natural and regular transition from

one to the other. In like manner the cases of identical species in the eastern and western islands of the Archipelago are due to the gradual and accidental commingling of originally absolutely distinct faunas.

In our second class (representative species) we must place the Wild Pigs, which seem to be of distinct but closely allied species in each island; the Squirrels also of Celebes are of peculiar species, as are the Woodpeckers and Hornbills, and two Celebes birds of the Asiatic genera *Phenicophæus* and *Acridotheres*. Now these and a few more of like character are closely allied to other species inhabiting Java, Borneo, or the Philippines. We have only therefore to suppose that the species of the western passed over to the eastern islands at so remote a period as on one side or the other to have become extinct, and to have been replaced by an allied form, and we shall have produced exactly the state of things now existing. Such extinction and such replacement we know has been continually going on. Such has been the regular course of nature for countless ages in every part of the earth of which we have geological records; and unless we are prepared to show that the Indo-Australian Archipelago was an altogether exceptional region, such must have been the course of nature here also. If these islands have existed in their present form only during one of the later divisions of the Tertiary period, and if interchange of species at very rare and distant intervals has occurred, then the fact of some identical and other closely allied species is a necessary result, even if the two regions in question had been originally peopled by absolutely distinct creations of organic beings, and there had never been any closer connexion between them than now exists. The occurrence of a limited number of representative species in the two divisions of the Archipelago does not therefore prove any true transition from one to the other.

The examples of our third class—of peculiar genera having little or no affinity with those of the adjacent islands—are almost entirely confined to Celebes, and render that island a district *per se*, in the highest degree interesting. *Cynopithecus*, a genus of Baboons, the extraordinary Babirusa and the singular ruminant *Anfa depressicornis* have nothing in common with Asiatic mammals, but seem more allied to those of Africa. A quadrumanous animal of the same genus (perhaps identical) occurs in the little island of Bat-chian, which forms the extreme eastern limit of the highest order of mammalia. An allied species is also said to exist in the Philippines. Now this occurrence of quadrumana in the Australian

region proves nothing whatever as regards a transition to the western islands, which, among their numerous monkeys and apes, have nothing at all resembling them. The species of Celebes and Batchian have the high superorbital ridge, the long nasal bone, the dog-like figure, the minute erect tail, the predaceous habits and the fearless disposition of the true Baboons, and find their allies nowhere nearer than in tropical Africa. The *Anoa* seems also to point towards the same region, so rich in varied forms of Antelopes.

In the class of birds, Celebes possesses a peculiar genus of Parrots (*Prioniturus*), said to occur also in the Philippines; *Meropogon*, intermediate between an Indian and an African form of Bee-eaters; and the anomalous *Scissirostrum*, which Prince Bonaparte places next to a Madagascar bird, and forms a distinct subfamily for the reception of the two. Celebes also contains a species of *Coracias*, which is here quite out of its normal area, the genus being otherwise confined to Africa and continental India, not occurring in any other part of the Archipelago. The Celebes bird is placed, in Bonaparte's 'Conspectus,' between two African species, to which therefore I presume it is more nearly allied than to those of India. Having just received Mr. Smith's Catalogue of the Hymenoptera collected during my first residence in Celebes, I find in it some facts of an equally singular nature. Of 103 species, only 16 are known to inhabit any of the western islands of the Archipelago, while 18 are identical with species of continental India, China, and the Philippine Islands, two are stated to be identical with insects hitherto known only from tropical Africa, and another is said to be most closely allied to one from the Cape.

These phenomena of distribution are, I believe, the most anomalous yet known, and in fact altogether unique. I am aware of no other spot upon the earth which contains a number of species, in several distinct classes of animals, the nearest allies to which do not exist in any of the countries which on every side surround it, but which are to be found only in another primary division of the globe, separated from them all by a vast expanse of ocean. In no other case are the species of a genus or the genera of a family distributed in *two* distinct areas separated by countries in which they do not exist; so that it has come to be considered a law in geographical distribution, "that both species and groups inhabit continuous areas."

Facts such as these can only be explained by a bold acceptance of vast changes in the surface of the earth. They teach us that this island of Celebes is more ancient than most of the islands

now surrounding it, and obtained some part of its fauna before they came into existence. They point to the time when a great continent occupied a portion at least of what is now the Indian Ocean, of which the islands of Mauritius, Bourbon, &c. may be fragments, while the Chagos Bank and the Keeling Atolls indicate its former extension eastward to the vicinity of what is now the Malayan Archipelago. The Celebes group remains the last eastern fragment of this now submerged land, or of some of its adjacent islands, indicating its peculiar origin by its zoological isolation, and by still retaining a marked affinity with the African fauna.

The great Pacific continent, of which Australia and New Guinea are no doubt fragments, probably existed at a much earlier period, and extended as far westward as the Moluccas. The extension of Asia as far to the south and east as the Straits of Macassar and Lombock must have occurred subsequent to the submergence of both these great southern continents; and the breaking up and separation of the islands of Sumatra, Java, and Borneo has been the last great geological change these regions have undergone. That this has really taken place as here indicated, we think is proved by the following considerations. Not more than twenty (probably a smaller number) out of about one hundred land birds of Celebes at present known are found in Java or Borneo, and only one or two of twelve or fifteen Mammalia. Of the Mammalia and birds of Borneo, however, at least three-fourths, probably five-sixths, inhabit also Java, Sumatra, or the peninsula of Malacca. Now, looking at the direction of the Macassar Straits running nearly north and south, and remembering we are in the district of the monsoons, a steady south-east and north-west wind blowing alternately for about six months each, we shall at once see that Celebes is more favourably situated than any other island to receive stray passengers from Borneo, whether drifted across the sea or wafted through the air. The distance too is less than between any of the other large islands; there are no violent currents to neutralize the action of the winds; and numerous islets in mid-channel offer stations which might rescue many of the wanderers, and admit, after repose, of fresh migrations. Between Java and Borneo the width of sea is much greater, the intermediate islands are fewer, and the direction of the monsoons *along* and not *across* the Java sea, accompanied by alternating currents in the same direction, must render accidental communication between the two islands exceedingly difficult; so that where the facilities for intercommunication are greatest, the number of species common to the two

countries is least, and *vice versa*. But again, the mass of the species of Borneo, Java, &c., even when not *identical* are *congeneric*, which, as before explained, indicates *identity* at an earlier epoch; whereas the great mass of the fauna of Celebes is widely different from that of the western islands, consisting mostly of genera, and even of entire families, altogether foreign to them. This clearly points to a former total diversity of forms and species,—existing similarities being the result of intermixture, the extreme facilities for which we have pointed out. In the case of the great western islands a former more complete identity is indicated, the present differences having arisen from their isolation during a considerable period, allowing time for that partial extinction and introduction of species which is the regular course of nature. If the very small number of western species in Celebes is all that the most favourable conditions for transmission could bring about, the complete similarity of the faunas of the western islands could never (with far less favourable conditions) have been produced by the same means. And what other means can we conceive but the former connexion of those islands with each other and with the continent of Asia?

In striking confirmation of this view we have physical evidence of a very interesting nature. These countries are in fact *still connected*, and that so completely that an elevation of only 300 feet would nearly double the extent of tropical Asia. Over the whole of the Java Sea, the Straits of Malacca, the Gulf of Siam, and the southern part of the China Sea, ships can anchor in less than fifty fathoms. A vast submarine plain unites together the apparently disjointed parts of the Indian zoological region, and abruptly terminates, exactly at its limits, in an unfathomable ocean. The deep sea of the Moluccas comes up to the very coasts of Northern Borneo, to the Strait of Lombok in the south, and to near the middle of the Strait of Macassar. May we not therefore from these facts very fairly conclude that, according to the system of alternate bands of elevation and depression that seems very generally to prevail, the last great rising movement of the volcanic range of Java and Sumatra was accompanied by the depression that now separates them from Borneo and from the continent?

It is worthy of remark that the various islands of the Moluccas, though generally divided by a less extent of sea, have fewer species in common; but the separating seas are in almost every case of immense depth, indicating that the separation took place at a much earlier period. The same principle is well illustrated by the Asi-

tribution of the genus *Paradisea*, two species of which (the common Birds of Paradise) are found only in New Guinea and the islands of Aru, Mysol, Waigiou, and Jobie, all of which are connected with New Guinea by banks of soundings, while they do not extend to Ceram or the Ké Islands, which are no further from New Guinea, but are separated from it by deep sea. Again, the chain of small volcanic islands to the west of Gilolo, though divided by channels of only ten or fifteen miles wide, possess many distinct representative species of insects, and even, in some cases, of birds also. The Baboons of Batchian have not passed to Gilolo, a much larger island, only separated from it by a channel ten miles wide, and in one part almost blocked up with small islands.

Now looking at these phenomena of distribution, and especially at those presented by the fauna of Celebes, it appears to me that a much exaggerated effect, in producing the present distribution of animals, has been imputed to the accidental transmission of individuals across intervening seas; for we have here as it were a test or standard by which we may measure the possible effect due to these causes, and we find that, under conditions perhaps the most favourable that exist on the globe, the percentage of species derived from this source is extremely small. When my researches in the Archipelago are completed, I hope to be able to determine with some accuracy this numerical proportion in several cases; but in the mean time we will consider 20 per cent. as the probable maximum for birds and mammals which in Celebes have been derived from Borneo or Java.

Let us now apply this standard to the case of Great Britain and the Continent, in which the width of dividing sea and the extent of opposing coasts are nearly the same, but in which the species are almost all identical,—or to Ireland, more than 90 per cent. of whose species are British,—and we shall at once see that no theory of transmission across the present Straits is admissible, and shall be compelled to resort to the idea of a very recent separation (long since admitted), to account for these zoological phenomena.

It is, however, to the oceanic islands that we consider the application of this test of the most importance. Let any one try to realize the comparative facilities for the transmission of organized beings across the Strait of Macassar from Borneo to Celebes, and from South Europe or North Africa to the island of Madeira, at least four times the distance, and a mere point in the ocean, and he would probably consider that in a given period a hundred cases of transmission would be more likely to occur in the former case

than one in the latter. Yet of the comparatively rich insect-fauna of Madeira, 40 per cent. are continental species ; and of the flowering plants more than 60 per cent. The Canary Islands offer nearly similar results. Nothing but a former connexion with the Continent will explain such an amount of specific identity (the weight of which will be very much increased if we take into account the representative species) ; and the direction of the Atlas range towards Teneriffe, and of the Sierra Nevada towards Madeira, are material indications of such a connexion.

The Galapagos are no further from South America than Madeira is from Europe, and, being of greater extent, are far more liable to receive chance immigrants ; yet they have hardly a species identical with any inhabiting the American continent. These islands therefore may well have originated in mid-ocean ; or if they ever were connected with the mainland, it was at so distant a period that the natural extinction and renewal of species has left not one in common. The character of their fauna, however, is more what we should expect to arise from the chance introduction of a very few species at distant intervals ; it is very poor ; it contains but few genera, and those scattered among unconnected families ; its genera often contain several closely allied species, indicating a single antitype.

The fauna and flora of Madeira and of the Canaries, on the other hand, have none of this chance character. They are comparatively rich in genera and species ; most of the principal groups and families are more or less represented ; and, in fact, these islands do not differ materially, as to the general character of their animal and vegetable productions, from any isolated mountain in Europe or North Africa of about equal extent.

On exactly the same principles, the very large number of species of plants, insects, and birds, in Europe and North America, either absolutely identical or represented by very closely allied species, most assuredly indicates that some means of land communication in temperate or sub-arctic latitudes existed at no very distant geological epoch ; and though many naturalists are inclined to regard all such views as vague and unprofitable speculations, we are convinced they will soon take their place among the legitimate deductions of science.

Geology can detect but a portion of the changes the surface of the earth has undergone. It can reveal the past history and mutations of what is now dry land ; but the ocean tells nothing of her bygone history. Zoology and Botany here come to the aid of

their sister science, and by means of the humble weeds and despised insects inhabiting its now distant shores, can discover some of those past changes which the ocean itself refuses to reveal. They can indicate, approximately at least, where and at what period former continents must have existed, from what countries islands must have been separated, and at how distant an epoch the rupture took place. By the invaluable indications which Mr. Darwin has deduced from the structure of coral reefs, by the surveys of the ocean-bed now in progress, and by a more extensive and detailed knowledge of the geographical distribution of animals and plants, the naturalist may soon hope to obtain some idea of the continents which have now disappeared beneath the ocean, and of the general distribution of land and sea at former geological epochs.

Most writers on geographical distribution have completely overlooked its connexion with well-established geological facts, and have thereby created difficulties where none exist. The peculiar and apparently endemic faunæ and floræ of the oceanic islands (such as the Galapagos and St. Helena) have been dwelt upon as something anomalous and inexplicable. It has been imagined that the more simple condition of such islands would be to have their productions identical with those of the nearest land, and that their actual condition is an incomprehensible mystery. The very reverse of this is however the case. We really require no speculative hypothesis, no new theory, to explain these phenomena; they are the logical results of well-known laws of nature. The regular and unceasing extinction of species, and their replacement by allied forms, is now no hypothesis, but an established fact; and it necessarily produces such peculiar faunæ and floræ in all but recently formed or newly disrupted islands, subject of course to more or less modification according to the facilities for the transmission of fresh species from adjacent continents. Such phenomena therefore are far from uncommon. Madagascar, Mauritius, the Moluccas, New Zealand, New Caledonia, the Pacific Islands, Juan Fernandez, the West India Islands, and many others, all present such peculiarities in greater or less development. It is the instances of identity of species in distant countries that presents the real difficulty. What was supposed to be the more normal state of things is really exceptional, and requires some hypothesis for its explanation. The phenomena of distribution in the Malay Archipelago, to which I have here called attention, teach us that, however narrow may be the strait separating an island from its con-

continent, it is still an impassable barrier against the passage of any considerable number and variety of land animals; and that in all cases in which such islands possess a tolerably rich and varied fauna of species mostly identical, or closely allied with those of the adjacent country, we are forced to the conclusion that a geologically recent disruption has taken place. Great Britain, Ireland, Sicily, Sumatra, Java and Borneo, the Aru Islands, the Canaries and Madeira, are cases to which the reasoning is fully applicable.

In his introductory Essay on the Flora of New Zealand, Dr. Hooker has most convincingly applied this principle to show the former connexion of New Zealand and other southern islands with the southern extremity of America; and I will take this opportunity of calling the attention of zoologists to the very satisfactory manner in which this view clears away many difficulties in the distribution of animals. The most obvious of these is the occurrence of Marsupials in America only, beyond the Australian region. They evidently entered by the same route as the plants of New Zealand and Tasmania which occur in South temperate America, but having greater powers of dispersion, a greater plasticity of organization, have extended themselves over the whole continent though with so few modifications of form and structure as to point to a unity of origin at a comparatively recent period. It is among insects, however, that the resemblances approach in number and degree to those exhibited by plants. Among Butterflies the beautiful *Heliconidæ* are strictly confined to South America, with the exception of a single genus (*Hamadryas*) found in the Australian region from New Zealand to New Guinea. In Coleoptera many families and genera are characteristic of the two countries; such are *Pseudomorphidæ* among the Geodephaga, *Lamprimidæ* and *Syndesidæ* among the Lucani, *Anoplognathidæ* among the Lamellicornes, *Stigmoderidæ* among the Buprestes, *Natalis* among the Cleridæ, besides a great number of representative genera. This peculiar distribution has hitherto only excited astonishment, and has confounded all ideas of unity in the distribution of organic beings; but we now see that they are in exact accordance with the phenomena presented by the flora of the same regions, as developed in the greatest detail by the researches of Dr. Hooker.

It is somewhat singular, however, that not one *identical species* of insect should yet have been discovered, while no less than 89 species of flowering plants are found both in New Zealand and South America. The relations of the animals and of the plants

of these countries must necessarily depend on the same physical changes which the Southern hemisphere has undergone; and we are therefore led to conclude that insects are much less persistent in their specific forms than flowering plants, while among Mammalia and land birds (in which no genus even is common to the countries in question) species must die and be replaced much more rapidly than in either. And this is exactly in accordance with the fact (well established by geology) that at a time when the shells of the European seas were almost all identical with species now living, the European Mammalia were almost all different. The duration of life of species would seem to be in an inverse proportion to their complexity of organization and vital activity.

In the brief sketch I have now given of this interesting subject, such obvious and striking facts alone have been adduced as a traveller's note-book can supply. The argument must therefore lose much of its weight from the absence of detail and accumulated examples. There is, however, such a very general accordance in the phenomena of distribution as separately deduced from the various classes or kingdoms of the organic world, that whenever one class of animals or plants exhibits in a clearly marked manner certain relations between two countries, the other classes will certainly show similar ones, though it may be in a greater or a less degree. Birds and insects will teach us the same truths; and even animals and plants, though existing under such different conditions, and multiplied and dispersed by such a generally distinct process, will never give conflicting testimony, however much they may differ as regards the amount of relationship between distant regions indicated by them, and consequently notwithstanding the greater or less weight either may have in the determining of questions of this nature.

This is my apology for offering to the Linnean Society the present imperfect outline in anticipation of the more detailed proofs and illustrations which I hope to bring forward on a future occasion.

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